Excavating Engineer

founded 1905

DECEMBER
1958

At a uranium mine near Rawlins, Wyo., ore is loaded by dragline after being loosened by a hydraulic ripper. A story begins on page 22.

TIME IS MONEY

See How These Contractors Saved It!

HOME BUILDING

During development of Forrest Park Homes subdivision, East Norwich, L.I., Marangoni, Pulcini, & Co., Long Island, whipped out cesspool excavations averaging 200 cubic yards in less than 1½ hours each! This 22-B Transit Clamshell handled the cesspools for 46 homes in the development.

CHURCH BUILDING

Rocket Crane Service, Minneapolis, Minn., made quick work of unloading and spotting 30 precast concrete floor joists, using the 15-B's stability for longer reaches from one work position. Joists used in construction of this suburban church measure 37 feet by 3 feet, weigh 7,000 pounds each.

PLANT CONSTRUCTION

This 15-B excavated a wide trench for sewer pipe at the new Ford glass plant in Nashville, Tennessee. Owners Wrenn-Singleton-Gallagher Co. then used the same machine to place the pipe. Said operator Chris McGrady: "This is the fastest, easiest-handling machine I've ever used!"

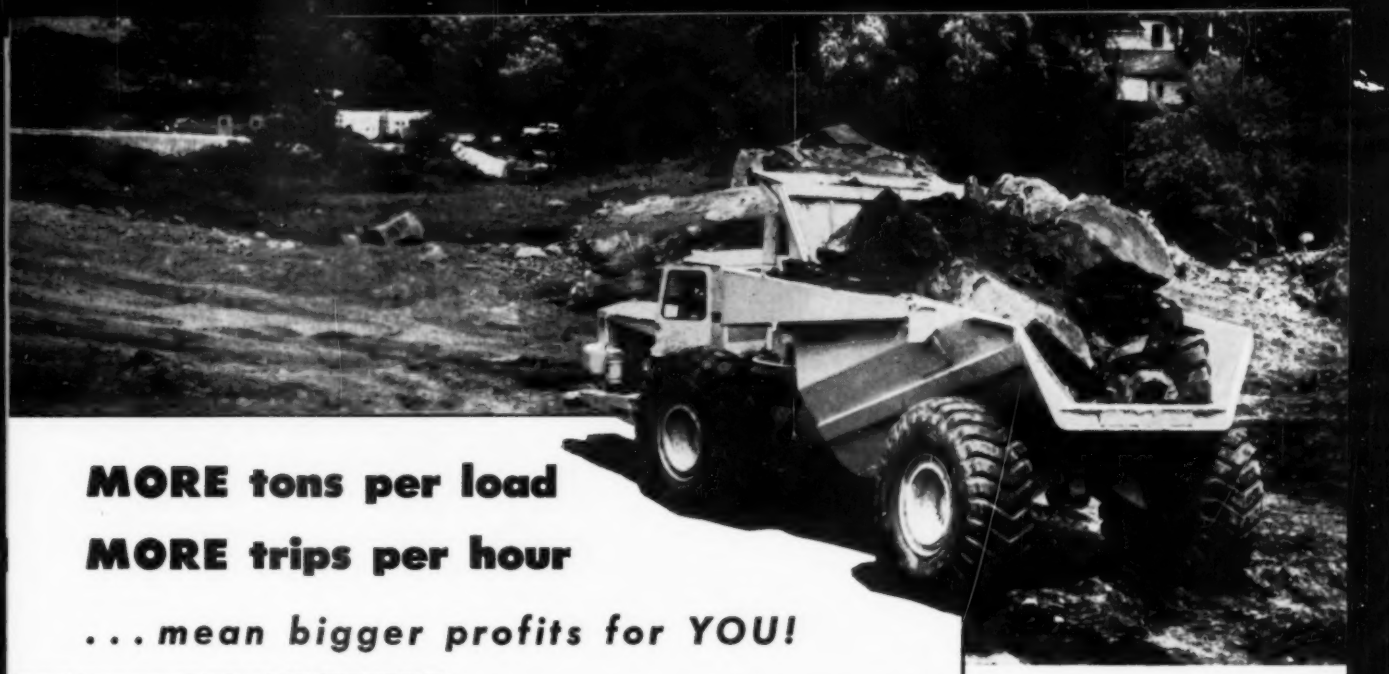
This kind of high-speed, multi-duty performance is one more reason why contractors like yourself can make profitable use of Bucyrus-Erie cranes and excavators.

It costs nothing to find out more about the Bucyrus-Erie that meets your needs exactly. See your nearby distributor for information about *all* the big Transit Cranes — the 10-ton 11-B, 15-ton 15-B, 25-ton 22-B and the big 35-ton 30-B. Do it today! Bucyrus-Erie Company, South Milwaukee, Wis.

475E58C

BUCYRUS ERIE

A familiar sign at scenes of progress!



MORE tons per load
MORE trips per hour
...mean bigger profits for YOU!

Low rear-entry and wide bowl provide easy target for shovel operator... make for fast swing-out of dipper, let operator heap maximum yardage *fast*, with minimum spillage.

At touch of electric dashboard switch, body lifts, swings low behind rear wheels... dumps clean over bank's edge. On soft fills, Rear-Dump can pull out without wheel-spin. Operator "walks" unit free with electric kingpin-steer ...or "humps" it out by varying wheel-base through use of electric hoist-motor and alternate use of front and rear wheel brakes.

The 35-ton (28-yd.) LeTourneau-Westinghouse B Tournapull® Rear-Dump lets you load and haul *big* loads anywhere. And with speeds to 34 mph, this high-production, off-road hauler delivers more material per shift! Here's why:

Greater maneuverability

Big "B" makes continuous 180° turn in space only 35′ wide . . . in dump position, in just 27′. This unusual maneuverability lets you work in restricted quarters where conventional haulers often cannot go. You spot quicker at the shovel, dump faster, move more loads per day.

In addition, big *load-rated* tires let Rear-Dumps always take the shortest route — over pavement, rocky pit-floors, rough haul-roads, RR tracks, cross-country, or through muck and over soft fills. Time saved adds up to extra trips per shift.

Fast, easy loading

B Rear-Dump's large target (15′4″ long, 10′2″ wide) permits fast, easy loading without spillage. Open rear of body permits quick bucket swing-out, while dipper door is still open. Because it minimizes loading time, big 35-ton Tournapull Rear-Dump gets more loads per hour, earns bigger profits per day.

Dumps fast, clean

Flick of dashboard switch instantly activates point-of-action electric hoist-motor. Body raises quickly to desired angle. At full dump position, trailing edge of bowl is low behind rear wheels . . . so material cannot roll forward to lodge against wheels, nor pile under rear end. Streamlined body sheds stickiest material readily.

Safe, positive control with big brakes, electrotarder

Multi-disc air brakes on all 4 wheels provide 7,488 sq. in. of braking surface — permit quick, safe control with heaped load, on any grade, in any weather. Electrotarder gives additional *non-wearing* braking action, through resistance on generator. Parking brake, and automatic emergency braking system, are standard.

Interchangeable work units

Behind same basic prime-mover, the new faster-loading 28-yd. Fullpak* scraper, or 30-ton Crane, can be readily interchanged. For a small additional investment, these trailing units can help keep your Tournapull prime-mover profitably busy the year-around. Choice of 293 hp Cummins or 300 hp GM engines. Ask for complete details.

*Trademark—BR-1534-G-1

LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

KEEP MAINTENANCE COSTS IN LINE

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WIX Filter Cartridges are engineered specifically for every engine in construction service . . . gasoline or Diesel—mobile or stationary—for lube, fuel, and air.

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INTERNATIONAL
LE TOURNEAU • MURPHY
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and ALL OTHER
Construction Equipment

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Let WIX *team-up* with your maintenance section to give you Prescription Filtration that stops costly engine failures and reduces construction equipment down time. WIX Lube, Fuel, and Air Filter Cartridges keep damaging dirt, grit, and sludge out of vital engine areas. Install WIX HEVI-DUTY Cartridges in *all* your filters for this money-saving trouble-free ℟ filtration. They're made especially to stand up under tough operating conditions and work schedules.

WIX *teamwork* includes a FREE Filter Survey that lists every one of your engines with its correct lube, fuel, or air filter Cartridge replacement. And, your local WIX Wholesaler will stock a reserve supply of the particular Cartridges you need—one convenient source for fast filter service.

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Ask your Jobber, or write us—TODAY!

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Excavating Engineer

founded 1908

South Milwaukee, Wisconsin

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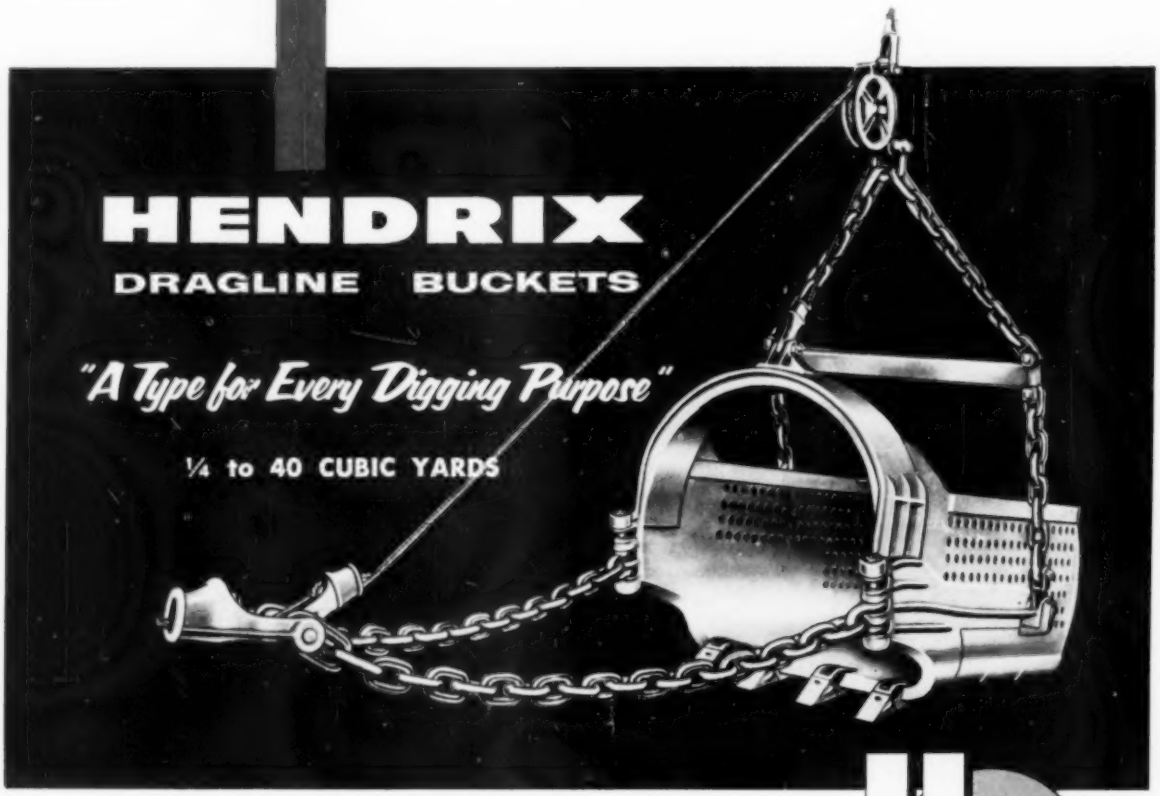

All Hendrix Buckets available without perforations

HENDRIX MANUFACTURING CO., Inc.

MANSFIELD, LOUISIANA

Hendrix Lightweight Dragline Buckets

SWING CLUTCHES!

WHAT is a Swing Clutch to you?—just another crane or hovel assembly?

Swing Clutches can make or lose money. You should find out all about them. Your Swing Clutches are being loaded and unloaded constantly. Heat dissipation is an important phase of their operation. They can be the source of wasted time in spotting loads particularly with long booms.

Northwest pioneered Uniform Pressure Swing Clutches for Shovel and Crane equipment. They are designed and built for Shovel and Crane service and in Northwest equipment they have reached the highest stage in the development of this type of assembly. No inside or outside band clutch is a Uniform Pressure Clutch. In the Northwest Uniform Pressure Clutch there is even pressure over the entire area of the clutch—there is no variation in clutching force as there is between the dead end and the live end of a band clutch.

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Northwest Uniform Pressure Swing Clutches mean smooth engagement, freedom from grabs and jerks, accuracy in spotting loads, longer life and greater output. A Northwest Man will be glad to fill in the details.

NORTHWEST ENGINEERING CO.
1506 Field Building, 135 South LaSalle Street
Chicago 3, Illinois

NORTHWEST *Always Ready to* **GO**

Western Contracting using

73 of them are Twin-Powered

Stage IV of Oahe Reservoir Project in South Dakota is a huge earthmoving job that involves 24½ million yards of excavation. Western Contracting Corp. is nearly a year ahead of schedule on their contract with the Corps of Engineers which calls for completion by November, 1959.

The Euclid fleet being used by this leading contractor totals 120 units . . . and 73 are big capacity, Twin-Powered scrapers, rear-dumps and crawler tractors. Working two 10-hour shifts 6 days a week, the "Eucs" are making the dirt fly . . . have moved as much as 110,000 yds. a day.

Twenty-five "Twin" Scrapers are push-loaded in heavy shale by big TC-12 Crawlers . . . get loads of about 30 yds. The TS-24 "Eucs" averaged 7½ loads per hour on a 2.2 mile cycle with several long grades up to 5½% adverse. Good supervision and excellent haul roads helped in maintaining this high production, but good loading ability and fast travel speed of the "Eucs" were important factors, too. Project Manager "Rip" Collins commented, ". . . if it weren't for the "Twin", the shale in the spillway section wouldn't be a scraper job".

On big projects like Oahe, and on small yardage work, too, "Twins" are moving the cheapest dirt. Your Euclid dealer can arrange a demonstration on your job and show you why "Twins" give you a greater return on investment . . . get in touch with him before you bid that next job!

EUCLID Division of General Motors, Cleveland 17, Ohio

GM GENERAL MOTORS EUCLID

EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

120 "EUCS" at Oahe Dam...

For all big tractor jobs — push-loading large scrapers, heavy dozing, ripping hard shale and pulling big equipment — the TC-12 is a top performer. Independent track drive, full power shift with Torqmatic Drives and a total of 402 h.p. delivered to the power train give this Euclid "Twin" unequalled work-ability. Western has had TC-12 crawlers in their fleet for over 3 years . . . is using 18 of them at Oahe.

▲ *A total of 518 h.p., Torqmatic Drives, power on all four wheels, big capacity and a loading assist by Twin-Power "Euc" Crawlers, add up to high speed production. Here a TS-24 gets a heaped load of about 20 bank yds. of heavy shale in just over a half minute. "Twin" availability has been 90% or better in spite of working 20 hours a day, six days a week in tough material.*

Another application of Euclid "Twin-Power" is the 50-ton Model LLD. Western Contracting has used this size rear-dump for several years on big jobs such as the Indiana Turnpike, Ft. Randall, Gavins Point and Oahe Dams. With two 300 h.p. engines, each powering a separate axle through Torqmatic Drives, this "Euc" moves 50-ton loads over steep grades at fast travel speeds. ▶

For LOW UPKEEP, HIGH OUTPUT on Irrigation and Flood Control jobs

Near Claremont, Calif., a ¾-yd. Bucyrus-Erie 22-B Transit Dragline and a 54-B crawler-mounted dragline tackle different phases of a 7-mi. long concrete flood control channel.

Near Tampa, Fla., this 1-yd. Bucyrus-Erie 30-B helps dig and straighten drainage ditches at a phosphate mine.

In South Carolina, a Bucyrus-Erie 71-B excavates to change the course of the Waccamaw River near Conway for highway construction.

Choose Bucyrus-Erie Draglines

Designed For You! You can count on bonus output ability from your dragline when the boom carries a Bucyrus-Erie New-Design bucket. It's engineered for fast, full loading, clean dumping. Bucyrus-Erie buckets are made with BECOLOY — a steel alloy developed by Bucyrus-Erie especially for dragline buckets.

Field proved Bucyrus-Erie draglines can be the busiest machines on your project 12 months of the year. Sturdily-built, they've got what it takes for day-in, day-out performance . . . all the essentials for years of time-saving, cost-cutting, money-making dragline service.

- Carefully coordinated swing and hoist speeds.
- Fully responsive controls.
- Large area, high flotation crawlers OR highly mobile rubber-tired Transit Machines.
- Simple machinery arrangement . . . accessible for repairs and parts replacement.
- Oil enclosed gears plus easy lubrication of other important components through convenient grease fittings.

Take full advantage of Bucyrus-Erie convertibility, too — easy change-overs right on the job! See your Bucyrus-Erie distributor today for a complete proposal on the combination you need for your next big job: dragline-clamshell, crane-dragline-shovel, dragline-hoe, or any other front end combination that will keep you busy making money.

480E58C

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

A Familiar Sign BUCYRUS ERIE at Scenes of Progress

"Model 12... Finest track-type shovel ever designed" says R. L. Shepherd,

Shepherd Construction Co., Muscatine, Iowa

"On the basis of its performance for us, we are looking forward to buying another Model 12 'PAYLOADER' soon", says the owner of Shepherd Construction Co. "Because of its great versatility, it has our recommendation as a money-making tool for both large and small contractors."

"We've used our Model 12 on every conceivable type of job since January, 1957, and found its performance excellent in every way. Of all the wonderful improvements on the Model 12, we feel its center seating takes the spotlight. It makes the machine ride easy and provides excellent vision.

"The Model 12 has the finest bucket action we have ever used. Excavating from a solid bank, we've loaded out 8 to 9 yd. trucks with 3 passes in 2-minutes time. The normal bucket load is always 2-yds. plus. Its flotation is exceptionally good because the loaded bucket is balanced by the rear-mounted engine. All this along with its fine operating diesel engine, large torque-converter and power-shift transmission (master clutch eliminated) enables the Model 12 to give us a production record of which we are very proud."

FOR PROOF — ask for a Model 12 demonstration or write for your copy of an informative 8-page bulletin. The Frank G. Hough Co., Libertyville, Ill.

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LIBERTYVILLE, ILLINOIS
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THE FRANK G. HOUGH CO., 708 Sunnyside Ave., Libertyville, Ill.
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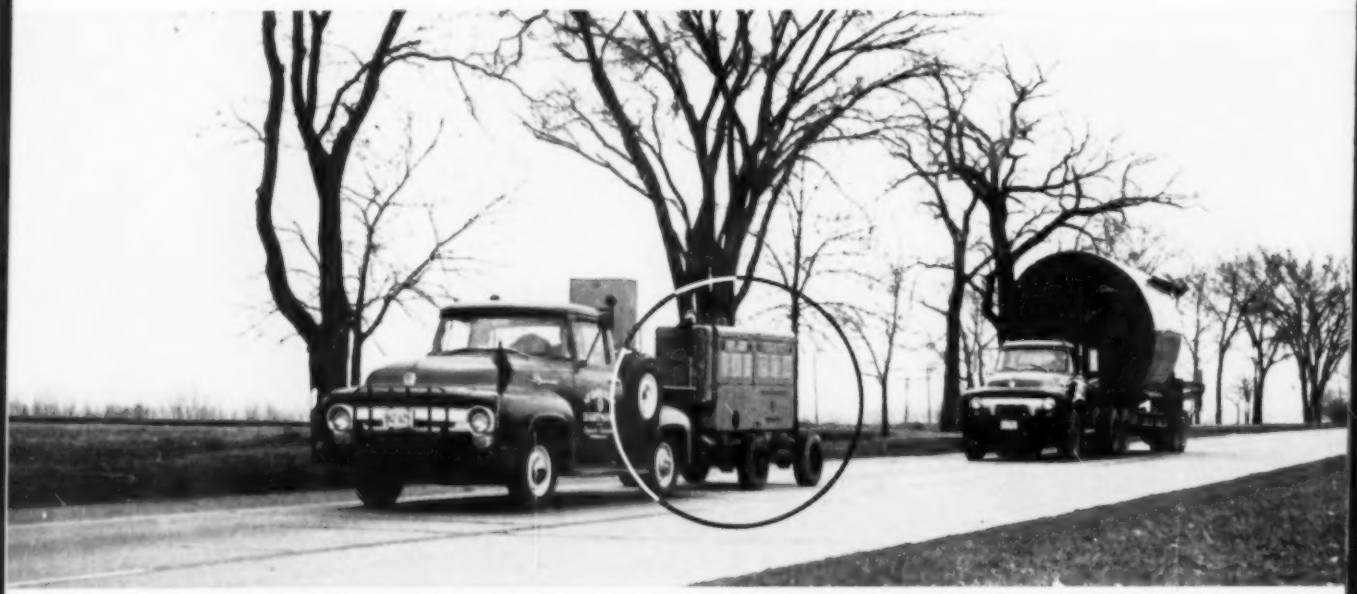
City _____ State _____

12-C-3

Cat power saved these owners $1,300



1 McDougal-Hartmann Co.'s, Heltzel Bin Hardy and Johnson Automatic Batching Plant follows their 40 KW Cat D315 Portable Electric Set to its fourth job site. Savings during the first year of ownership while moving them, alone have amounted to $3,900. Operational savings are not even included. The owners estimate that running in and hooking up to public utility power would have averaged at least $1,300 per move. An additional $1,200 was saved at the outset since the Electric Set would operate the plant's higher voltage electric motors which were supplied as original equipment.

2 At a previous job location in Sterling, Illinois, this unit produced 86.4 batches per hour for use on one of the firm's nearby road construction jobs.

Without portable power, it often requires the more common technique of setting up the batch plant along a railroad siding or right-of-way, bringing in materials by rail if the haul distance to the job is not excessive. Concrete specifications in some states limit the haul distance of mixed concrete due to the time element. All in all, Cat portable power saves operating time, cuts costs.

3 Many contracting companies with multi-state operations, such as McDougal-Hartmann, require power portability to avoid the frequent high cost and inconvenience of obtaining power in remote areas.

On their present job it would have necessitated stringing poles and wire from this power line to the plant location (in the circle). Instead, the highly mobile Cat Electric Set was rolled up alongside the batching plant, and hooked up with wall plug simplicity ready to go.

each time their batching plant moved

4 Performance and savings with this plant brought Mr. Jack Hartmann, Vice President (right), and Bud Moore, his C.D.E.S. (Caterpillar Dealer Engine Specialist), out to the job to plan a second batching plant installation. Satisfaction resulted in an order for a second identical Cat Electric Set for this contractor's expanding operations.

Mr. Hartmann remarked, "ABOUT ONE MORE MOVE AND OUR FIRST PORTABLE ELECTRIC SET WILL HAVE PAID FOR ITSELF IN SAVINGS FROM MOVES ALONE AND IN LESS THAN TWO YEARS. THAT WE LIKE TO SEE."

Engine Division, Caterpillar Tractor Co., Peoria, Ill., U.S.A.

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5 The all-new, self-regulated generator for Cat Electric Sets is simple to operate. Voltage is adjustable from 5% above to 10% below nominal rating and regulated within 3½% of rated voltage. It has unsurpassed motor starting ability. Other performance features Mr. Hartmann liked were:

1. Low over-all cost per operating hour.
2. No down time due to power failure or engine failure.
3. No additional help required, due to the unit's simplicity and self-regulating standard equipment.
4. Advertised power produced and maintained.
5. His Caterpillar Dealer Engine Specialist, Parts and Service teams were on around-the-clock availability if anything went wrong. It didn't.

ENGINE POWER BY CATERPILLAR

If something has gone wrong with your present engine or it just won't produce in your excavator, crusher or other construction machinery, talk it over with your C.D.E.S. He can aid you profitably when repowering older machines or specifying engines for new equipment.

Engine Division, Dept. EE12

CATERPILLAR TRACTOR CO., Peoria, Illinois, U.S.A.

Send me more information about the new Caterpillar Portable Electric Sets. I understand that I am under no obligation.

☐ I would like more detailed information as I may be in the market for a Caterpillar Construction Engine.

Name _____

Company _____

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City _____ *Zone* _____ *State* _____

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Mack quality begins with Mack-built major components—front and rear axles, engines, frames, transmissions and brakes—which are made to the highest standards in the industry . . . with Mack features like the exclusive Balanced Bogie with Power Divider for positive traction under severe weather and terrain conditions . . . and extends to Mack cabs, which offer the utmost in driver visibility and comfort, easy access to all working parts, and minimum upkeep requirements.

You'll find that Mack quality construction shows up in every phase of operation—and, where it really counts, in net profit figures.

Check with your Mack branch or distributor today to find out how Macks' profit-making capabilities can best be put to work for you. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

MACK
first name for
TRUCKS

for Better Value

American Cable VHS®

"Best Cable We Ever Used...We're for VHS 100%"

says Roadbuilders, Inc., Greenville, South Carolina

Today, more than ever before, road contractors appreciate the need for rugged cable to keep earth-moving equipment rolling on schedule. Many contractors, like Roadbuilders, Inc., have found the best possible answer to longer cable life. They use VHS—the remarkable new grade of wire rope that is tougher, more wear-resistant, and 15% stronger than the next best grade of wire rope. Contractor after contractor has discovered that VHS is still giving service long after other cable has been discarded. If the cable you are now using has failed you when you need it most, then learn how TRU-LAY VHS can help you save time and money.

What's different about Tru-Lay VHS?

TRU-LAY VHS is not just another "brand" of wire rope—it's a new *grade* of wire rope which is tops for quality and performance. Before TRU-LAY VHS (Very High Strength), the best grade you could buy was TRU-LAY Preformed Improved Plow Steel—and it still is the most practical grade of wire rope for some uses. However, where extra strength and toughness are needed—such as for draglines, shovel hoist ropes, scraper and dozer cable—you'll find TRU-LAY VHS outlasts and outperforms any other cable ever made.

Only one source for VHS

Thanks to expanded production and large warehouse stocks, you can now get immediate shipment of TRU-LAY VHS from American Cable distributors anywhere in the country. But remember . . . there's only one superior grade of wire rope—VHS; and only one company makes it—American Chain & Cable. So tell your distributor you want VHS next time you are ordering wire rope.

ACCO

American Cable Division

AMERICAN CHAIN & CABLE

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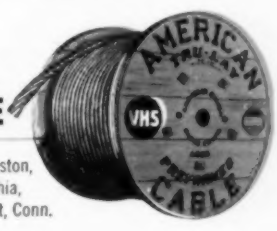

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GUATEMALA: Comercial MacDonald (Guatemala) S. A., Guatemala City.

HAITI: Compagnie Haitienne de Moteurs, S. A., Port-au-Prince.

HAWAIIAN ISLANDS: Theo. H. Davies & Co., Ltd., Honolulu and Hilo.

INDIA: Greaves Cotton & Co. Ltd., Bombay, Calcutta, Kanpur, Madras, and New Delhi.

INDONESIA: Lindeteves N. V., Amsterdam, Netherlands.

IRAN: Soufar Trading Co. Ltd., Teheran.

IRAQ: John Birch & Co. (Iraq) Ltd., Baghdad, Margil, and Mosul.

ISRAEL: Agricultural Engineering Co. of Israel Ltd., Haifa.

ITALY: M. I. D. E. C., Macchine Minerarie Edili ed Industriali, Milan.

JAMAICA: Robinson & Co. Ltd., Kingston. (Excavators). Caribbean Industrial Equipment, Ltd., Kingston. (Water Well Drills).

JAPAN: Daiichi Bussan Kaisha, Ltd., Tokyo.

JORDAN: Nagib Baki & Sons (Transjordan) Ltd., Amman.

KENYA: Gailey & Roberts Ltd., Nairobi.

KOREA: American Trading Co., Inc., Seoul.

KUWAIT: Mohamed Abdul Rahman Al-Bahar, Kuwait.

LAOS: Denis Freres d'Indochine, Saigon.

LEBANON: Nagib Baki & Sons, Beirut.

LIBERIA: Liberia Tractor & Equipment Co., Monrovia.

LIECHTENSTEIN: Robert Aebi & Co. Ltd., Zurich, Switzerland.

LUXEMBURG: Tractor & Equipment Co., S. A., (TRECO), Brussels, Belgium.

MADAGASCAR: See French Union.

MALAYAN FEDERATION: Harper Gilfillan & Co. Ltd., Kuala Lumpur, Selangor.

MEXICO: Equipos Mecanicos, S. A., Mexico 5, D. F., and Guadalajara.
Equipos Mecanicos del Norte, S. A., Monterrey and Tampico.
Maquinaria General de Chihuahua, S. A., Chihuahua.
Equipos Mecanicos de la Laguna, S. A., Torreon.

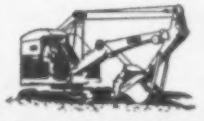
Water Well Drills

Oil Well Drills

Blast Hole Drills

Rotary Drills

Hydrocranes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In the foothills of the Sierra Morenas in Spain, where once the Romans mined, the Tharsis Company produces sulphur and copper. In developing their opencast workings, the Company operates on a fleet of Aveling-Barford "SL" Heavy-duty dumpers for the removal of overburden and the transportation of ore. Ruggedly built and equipped with 163 B.H.P. diesel engine, four forward and four reverse speed transmission, two-way power-assisted steering and hydraulic tipping, the "SL" (27,000 lb payload) Dumper has everything that the tough hauling jobs demand.

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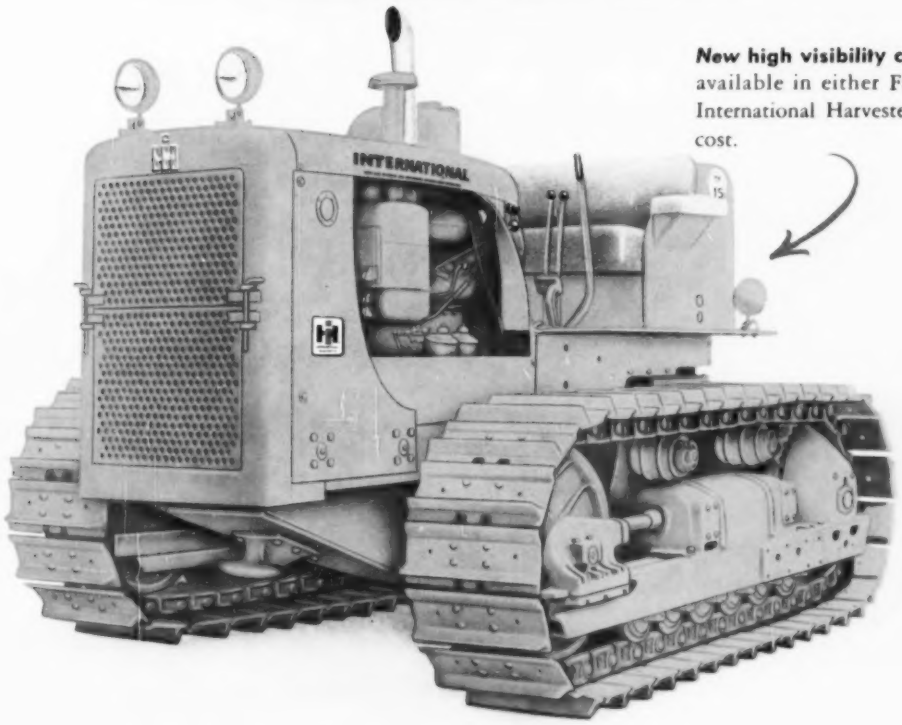

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6-cylinder diesel power . . . 105-hp fully-proven D-554 engine—full 20,500 lbs drawbar pull.

6-speed full-reverse transmission . . . 20% higher reverse speeds. A speed for every work or travel need plus fast "Shuttle-Bar" direction changing!

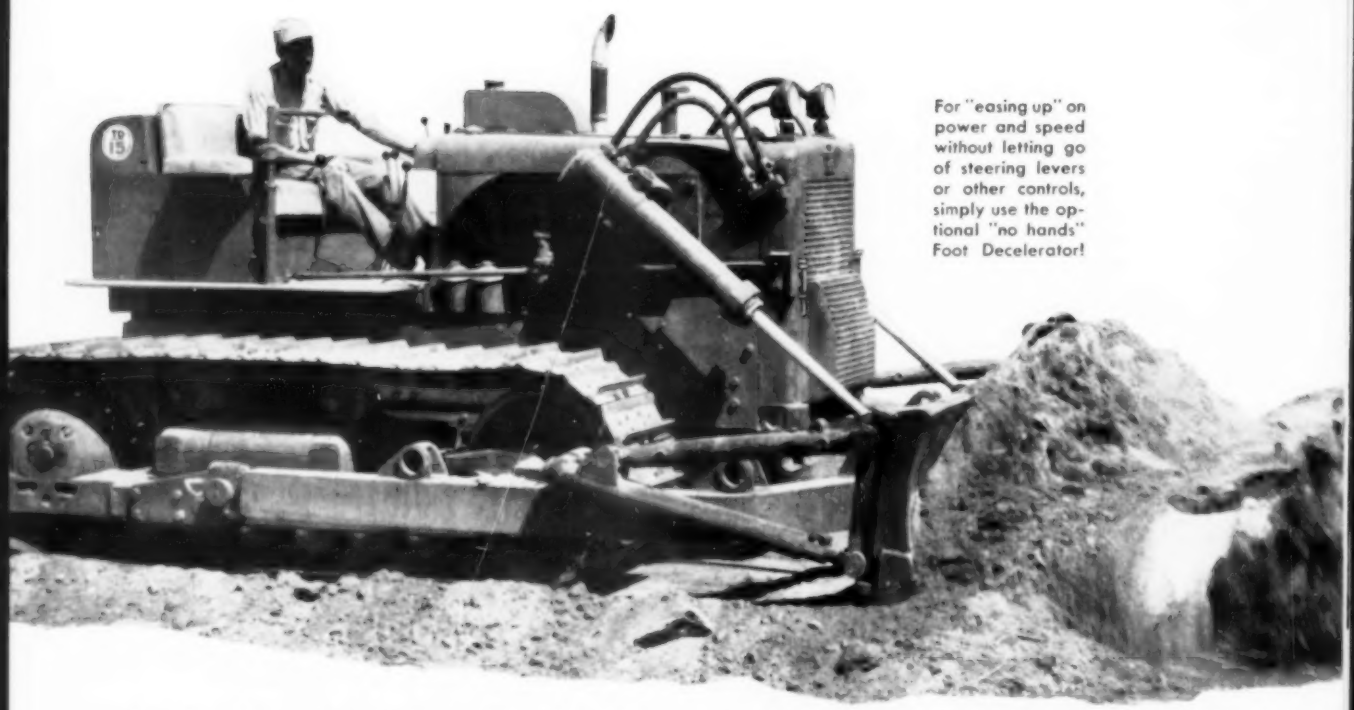
Precision control
Foot Decelerator for instant speed changes—fast "Shuttle-Bar" forward-reverse travel.

1,000-hour lube interval, heavy-duty track rollers
. . . heavy-duty, long-life bushing type, with extra capacity lube reservoir.

...and here's the pay-off for you...

You move in on...and speed up

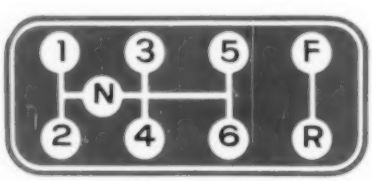
....with NEW TD-15



For "easing up" on power and speed without letting go of steering levers or other controls, simply use the optional "no hands" Foot Decelerator!

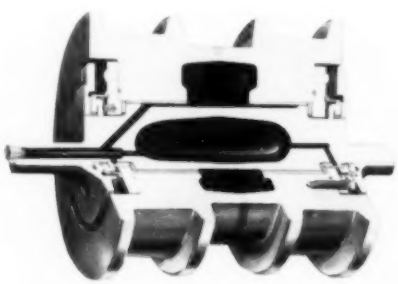
Exclusive six-speed "single stick" shift... forward and reverse "Shuttle-Bar"

You shift through all six speed ranges of the new TD-15—forward or reverse—with a single lever. Shift pattern is planned for gear-changing ease and speed with a fast sweep of the hand—to give you instant use of the speed you need. To speed the work-cycle and take full advantage of fast shifting, you simply push or pull the "Shuttle-Bar"—to change TD-15 forward or reverse instantly.



1,000-hour lube interval, heavy-duty, track rollers

Not just another "claim" . . . International now combines heavy-duty *bushing design*, exclusive cartridge-type *metal-to-metal seals*, and king-size lube reservoirs, to offer the industry the first heavy-duty type roller as standard equipment on the TD-15. Thick shells for safe build-up and exclusive pressure relief passages for flush-out and prevention of seal damage from power lubricators are part of this new design.



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You get 6-cylinder smoothness from this new International D-554 diesel engine that powers the new TD-15. This fully-proven power plant produces its 105 net hp at 1,650 rpm . . . features famous International 45-degree angle operation full-flow lubrication, closed pressurized cooling, exclusive twin plunger pump fuel injection system, fully counter-balanced crankshaft, positive valve rotators, and all-weather gasoline conversion starting. Here's an engine built for long life, big-capacity output!

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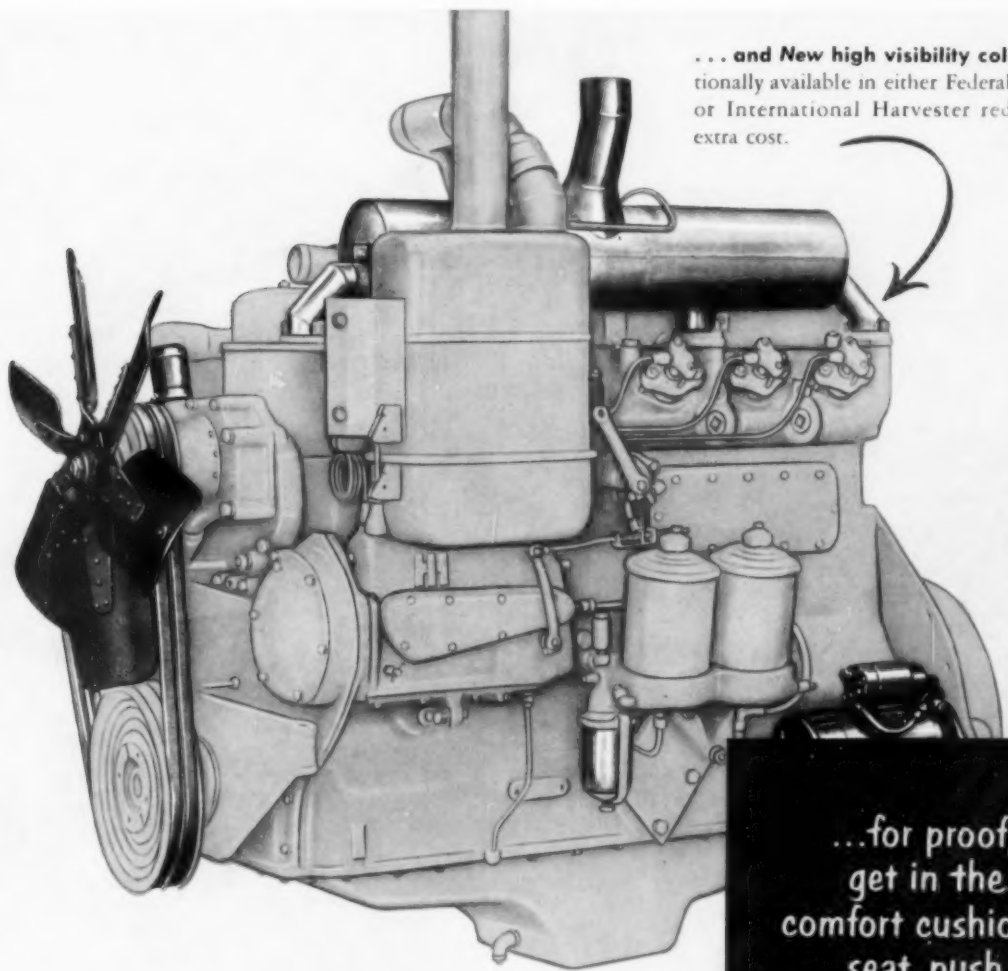

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Compare TD-15 performance to anything *in the 100 hp crawler field!*

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A Cat D8 and an Allis-Chalmers HD-20 dozer team up to push load a Euclid S-18 scraper. Stripping of soft overburden is easy.

Wyoming's Booming Uranium

by Ray Day

SOMEDAY, either for peaceful or destructive purposes, the awesome power of the United States atomic stockpile will be put to work. When it is, a portion of that stockpile will have come a long way from its inauspicious point of origin. It will have traveled from a flat, dingy mesa in central Wyoming through processing and purification works, finally emerging as the uranium isotope forming the basis for atomic energy.

The machine which started the uranium on its way was an excavator—a dragline, to be exact.

Western Nuclear Corp. is the owner of the dragline. Headquartered in Rawlins, Wyo., Western Nuclear has several properties scattered over the state. None is more unique than its Loma property, near the new settlement of Jeffrey City, 70 miles northwest of Rawlins.

The Loma property contains a uranium ore find about 3,000 feet long by 900 feet wide. It is a part of the Gas Hills, an area where geologists of the Atomic Energy Commission and the U. S. Geological Survey believed that no uranium could possibly exist. But a Riverton mechanic, Neil McNeese, went out in 1954 with a Geiger counter to locate the fabulously rich Lucky Mc property, about 6 airline miles northeast of the Loma.

Numerous Operators

Subsequently the Lucky Mc property was enlarged, branching east and west. At the present time the chief operators in the area are Central Gas Hills, Lucky Mc and Vitro. There is a West Gas Hills area, whose chief operators include Globe Mining, Gas Hills Mining and Western Nuclear, which has its Bullrush Pit in that section. The East Gas Hills section is also populated by uranium operators like Two States, Valley Dean, Dale Levi and Bengal.

Loma is an area to itself. It was located by deductive reasoning and brilliant geology, which theorized that ore should be where it is. Although the surface of the ground over the orebody showed no radioactive reading whatever, drill samples proved the existence of a massive body of uranium-bearing material.

The orebody is a tertiary sediment in the upper Wind River formation. The uranium occurs in gray angular sandstone as microscopic particles clustered around sand grains. The material is oxidized for only 40 feet, where the natural water table occurs. Below that point, the material is unoxidized. It seems largely unrelated to any apparent geo-

Open pit mining in deep cut for radioactive ore deposit creates difficult problems. Ground water is extremely heavy and pit crews must pump 700,000 gpd to keep the floor dry.

logical structure. The best that geologists can say is that it appears to be an old stream bed, and that the uranium leached out of some other parent formation, probably the younger White River formation.

In a routine development of its property, Western Nuclear contract drilled the area with rotary drills. A good orebody was located from 60 to 100 feet deep, and there is a deeper orebody lying from 200 to 450 feet below the ground surface. A heavy blue clay lens separates the upper overburden at the water line, so that the instant miners get into the water table they're in trouble. At the present time, 700,000 gallons of water per day are being pumped out of the pit, even though mining is relatively shallow. Careful estimates on the ultimate development indicate that upwards of 10,000 gpm will have to be handled, requiring possibly as many as 14 diesel engine-driven pumps, running continuously.

Quality of the ore ranges from about .06 of 1% to over 1%. The purification plant was designed around an average product of .2 of 1% of uranium. In other words, the average amount of uranium is 4 pounds per ton. The plant is set up to recover about 94% of that four pounds. In that respect it is one of the most efficient uranium processing plants in the nation.

To expedite early removal of the overburden, a stripping contract was let to Maco, of Rawlins. Maco was named after Malcolm Smith and Art Boatright, who make up the well-known highway construction firm of Boatright and Smith.

Since the material is all unconsolidated, a good high-speed earthmoving operation has been possible. Maco is using two Euclid S-18 scrapers, four International TD-14's, a Caterpillar D9 dozer-pusher, Allis-Chalmers HD-19 and HD-20 pusher tractors and two Caterpillar D8's.

Stripping is a double shift operation, with a one-way haul under 2,500 feet. The material is disposed of over an area where preliminary drilling proved no ore reserves existed. Since there is very little visual difference between the overburden and the good ore, careful pit control must be exercised. Mine officials and geologists have the drilling logs and hole locations to go on. To play it safe, the overburden is checked from time to time with Geiger counters.

(Above) A 6 x 6 Gorman-Rupp centrifugal pump driven by a Chrysler engine lifts ground water out of the pit. As the mine deepens, 14 diesel pumps will be used.

(Below) Loma Pit is a deep excavation gouged in the bleak Gas Hills. Uranium occurs in gray angular sandstone as microscopic particles clustered around sand grains.

Usual rule is to stop stripping immediately over the orebody, and then to drill further exploration holes on 25-ft. centers—considerably closer than the preliminary work—to locate the orebody exactly and to sample its degree of enrichment. After this testing has been done, mining can proceed.

Dig 1,800 Tons Daily

Careful planning by Western Nuclear was done to determine the best way of mining the uranium ore. Ground water, sensitive ground conditions and dilution of the ore with overburden all were serious problems. Production was important, too, because about 1,800 tons of ore and waste material per day have to be brought up out of the pit to keep the Jeffrey City mill supplied.

A 1½-yd. Bucyrus-Erie 38-B drag-

Dragline loads ore into trucks with a 1½-yd. bucket. Ground water is trained around the excavation area in a shallow trench.

line was acquired and it was equipped with two buckets—one as a work bucket; the other a spare. A Bucyrus-Erie 1¾-yd. bucket and another bucket of the same size are being used. The machine is equipped with a 50-ft. boom.

One of the first jobs in mining the west pit floor is to dig a 5-ft. deep trench close in against the three low sides of the pit, training the trench slightly downgrade so that ground water can flow freely into the low point. There is some clay in the uranium-bearing formation, and there is a particularly heavy lens of clay higher up. It is imperative to keep the water trained in the drainage ditch, so that pumps at the low end can keep the ground water under control. At the present time, a 6 x 6-in. Gorman-Rupp centrifugal pump driven by a Chrysler industrial engine is being used, along with a Jaeger centrifugal. Two Stang 410-A pumps, driven by 100-hp diesels, have been ordered to help boost ground water up through the high pipelines which leave the pit. Water pumping is a seven days a week, 24 hours a day operation, and pump men are on the payroll on a steady basis.

Material excavated to create the ditch, of course, is good ore, so it is loaded to a fleet of International and Euclid trucks, which take it out of the pit. The main pit floor then is excavated in the careful manner which has become typical of mining valuable uranium.

The 38-B's operator loads each dragline bucket by a pull of about 20 feet. The pass doesn't exceed 18 inches in

(Left) As ore leaves the pit, samples are augered into a test receptacle. (Center) A Michigan Y-24 hoe cleans up an ore pocket.

depth. Purpose of this is to localize the digging in as short an area as possible, so that ore will not become too diluted with overburden and will reflect the grade of as small an area as possible. The orebody is far from regular in its formation, and there are many places where it dips, branches off, or ends abruptly. By making these short, definite passes, the grade of ore can be controlled at the machine. This is important since, later on, the ore must be blended to send a uniform product into the mill.

The 38-B continues its short, regular digging cycles, either moving sidewise across the pit floor, or taking a long, narrow ribbon at a time. According to production officials at the mine, the dragline method is working better than anything else which was tried—front end tractor loaders, power shovels or bucket-type loaders, for example—because of the conditions of sand and water.

Rip Ore Formation

A new Caterpillar D9 with Ateco rear-end hydraulic ripper also is helping the dragline by ripping the formation ahead of the direction in which the machine is working. There are places, however, where ripping is unnecessary.

Shielded Geiger counters are being used for pit control to sample the quality of material. Geiger counters with lode probes also are helping to keep the ore located, and to a lesser extent the ore shows up by visual inspection. In many areas of the pit it is almost impossible to distinguish the good ore from the overburden, but in the higher-grade material the ore has a slightly darker color.

Some drilling and shooting has been done, particularly along the tight side of the pit. A Gardner-Denver MK motor-driven auger drill is being used for that work. It is attached to a boom mounting on a LeRoi Tractair compressor. In use are 4-in. diameter auger bits with tungsten-carbide points, along with Hughes Tri-Cone 3½-in. diameter bits. Blasting is already particularly tricky, and the pit is only about 60 feet deep. The sides are sensitive, however, so that large, heavy charges shot instantaneously are clearly out of the question. The firm has done the shooting with Gelex 45% powder, keeping the shots as small as possible.

Vibration may be reduced still further by using millisecond delays, so that only one hole explodes at a time. Drilling and shooting is expected to keep the ½ (horizontal) on 1 (vertical) pit slopes from crowding in, and it may even make the use of vertical walls practical. Experiments have been conducted with everything from vertical walls to 2 on 1 slopes. The ½ on 1 side slopes appear to offer a balance between economical mining and sidewall stability.

As the loaded trucks leave the 38-B and work their way out of the pit up the 8% grade haul road, they stop at a sampling shack just outside the pit. Technicians at this point use Eberline ore analyzers, taking the samples with the aid of electric 1½-in. augers, which reach down through an entire truckload. Essentially a beta counter, this ore analyzer gives a quick, fairly precise assay of enrichment, and permits the trucks to sort their dumped loads on a blending pad above the pit. A small representative fraction of each sample also is kept for each day, so that at the end of the day's run there is a composite Eberline assay available for chemical analysis.

On the blending pad, the truckloads are dumped in one of a number of different lots, graded according to the degree of enrichment. There is a high-waste lot, in which ore with an uranium content of .06 to .10 of 1% is stored. The No. 100 lot stores material whose uranium content is about .10 to .15 of

Exploratory drilling seldom stops. This rotary is working near outskirts of mine.

(Right) A rubber-tired loader stockpiles various grades of ore brought up from the pit. Material is blended for processing.

Dragline loads ore into trucks with a 1½-yd. bucket. Ground water is trained around the excavation area in a shallow trench.

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A new Caterpillar D9 with Ateco rear-end hydraulic ripper also is helping the dragline by ripping the formation ahead of the direction in which the machine is working. There are places, however, where ripping is unnecessary.

Shielded Geiger counters are being used for pit control to sample the quality of material. Geiger counters with lode probes also are helping to keep the ore located, and to a lesser extent the ore shows up by visual inspection. In many areas of the pit it is almost impossible to distinguish the good ore from the overburden, but in the higher-grade material the ore has a slightly darker color.

Some drilling and shooting has been done, particularly along the tight side of the pit. A Gardner-Denver MK motor-driven auger drill is being used for that work. It is attached to a boom mounting on a LeRoi Tractair compressor. In use are 4-in. diameter auger bits with tungsten-carbide points, along with Hughes Tri-Cone 3½-in. diameter bits. Blasting is already particularly tricky, and the pit is only about 60 feet deep. The sides are sensitive, however, so that large, heavy charges shot instantaneously are clearly out of the question. The firm has done the shooting with Gelex 45% powder, keeping the shots as small as possible.

Vibration may be reduced still further by using millisecond delays, so that only one hole explodes at a time. Drilling and shooting is expected to keep the ½ (horizontal) on 1 (vertical) pit slopes from crowding in, and it may even make the use of vertical walls practical. Experiments have been conducted with everything from vertical walls to 2 on 1 slopes. The ½ on 1 side slopes appear to offer a balance between economical mining and sidewall stability.

As the loaded trucks leave the 38-B and work their way out of the pit up the 8% grade haul road, they stop at a sampling shack just outside the pit. Technicians at this point use Eberline ore analyzers, taking the samples with the aid of electric 1½-in. augers, which reach down through an entire truckload. Essentially a beta counter, this ore analyzer gives a quick, fairly precise assay of enrichment, and permits the trucks to sort their dumped loads on a blending pad above the pit. A small representative fraction of each sample also is kept for each day, so that at the end of the day's run there is a composite Eberline assay available for chemical analysis.

On the blending pad, the truckloads are dumped in one of a number of different lots, graded according to the degree of enrichment. There is a high-waste lot, in which ore with an uranium content of .06 to .10 of 1% is stored. The No. 100 lot stores material whose uranium content is about .10 to .15 of

Exploratory drilling seldom stops. This rotary is working near outskirts of mine.

(Right) A rubber-tired loader stockpiles various grades of ore brought up from the pit. Material is blended for processing.

1%. The 200 lot stores .15 to .20 of 1% material; and so on.

Since the Jeffrey City mill is set up to process uranium ore on the basis of a .20 average product, high-grade and low-grade materials must be mixed and blended at this pad. Metals Transportation Co., of Jeffrey City, has the contract for hauling this material. The 10-yd. loads, chiefly in International, Mack and Kenworth trucks, are assembled by blending various scoopfuls of material with a Michigan 125A tractor loader. It is not an exact science, of course, but every effort is made to get an average blend of materials to send over the 20-mile haul to the mill.

Work Two Pits

When *Excavating Engineer* visited the work, the west pit was stripped and ore was being excavated. The bottom of that present pit is about 150 feet wide by 540 feet long, and later on there will be a 175-ft. wide by 240-ft. long extension. Maco's machines were busy at the same time excavating the east pit. It will be about 120 feet deep, 300 feet wide and 1,200 feet long. Ultimately it is expected that the pits will be deepened somewhere close to 300 feet, to recover the deep-lying ore.

In addition to the ore hauled in from its Loma property, the Jeffrey City mill also handles some ore from custom operators in the general vicinity. This ore, like that at Loma, is responsive to the acid leach resin-in-pulp process used at the mill.

Careful and precise sampling is done of each 200-ton lot of material entering the mill. The final Vizan sample is assayed chemically for uranium.

The complex purification process, reduced to its simplest essentials, starts when a Michigan 125-A tractor shovel scoops up the various lots of material and feeds them into the plant. The material passes directly into a hopper in the summertime when weather is dry; last winter it was pre-dried by passing it through a Pioneer 101 Continuflo asphalt plant drier. The material also passes through a primary jaw crusher

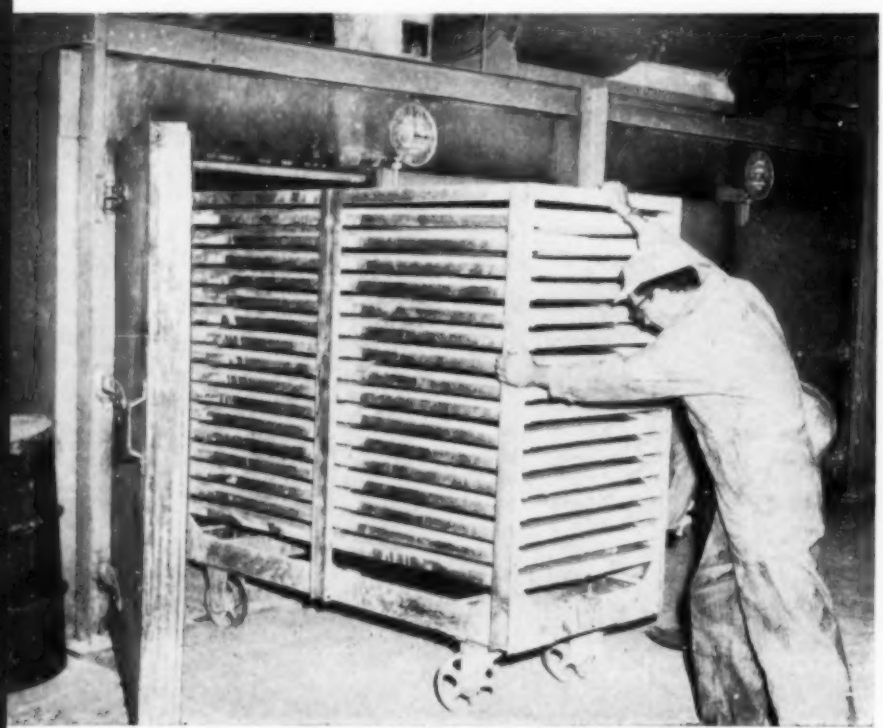
Uranium Is Where You Find It

The Wyoming Gas Hills uranium discovery, of which the Loma Pit is a part, revolutionized more than a few geological theories.

Expert geologists of the Atomic Energy Commission and the U. S. Geological Survey, acting on then-known theories, stated rather flatly that anyone looking in that area of Wyoming for uranium should have his head examined. It just wasn't there. There was no geological structure to sustain it. And none of the then-acceptable theories applied to the Geiger counter clicks emanating from the drab, desolate range country east and south of Riverton.

When a Riverton mechanic, untrained in geology, located the Lucky Mc property, geologists were forced to revise their estimates. Further exploration showed new adjoining properties, and the end may not yet be in sight. Exploratory drilling is going on over the entire area, as sample-drilling machines push bawling white-face calves out of the way.

The revision of a geological theory, forced by the inevitable pioneering instinct of Americans, will add immeasurably to the nation's security during the Cold War's uncertain period, and to her strength and leadership when the bright day comes when the atom will be used strictly for peaceful purposes.

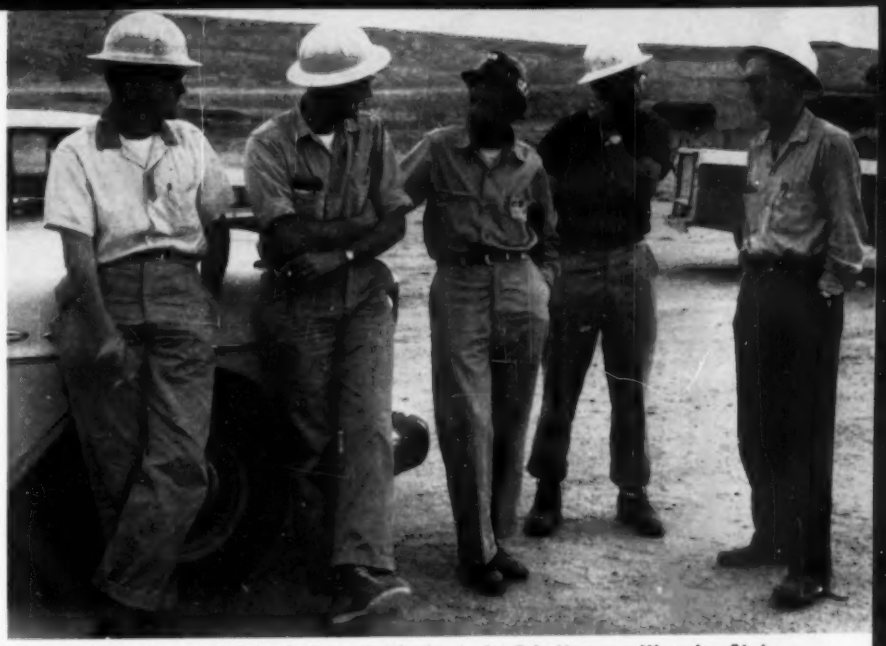


(Left) Uranium goes into heating furnace in the form of a yellow paste. (Below) Here is Western's processing plant located 20 miles from the Loma pit.

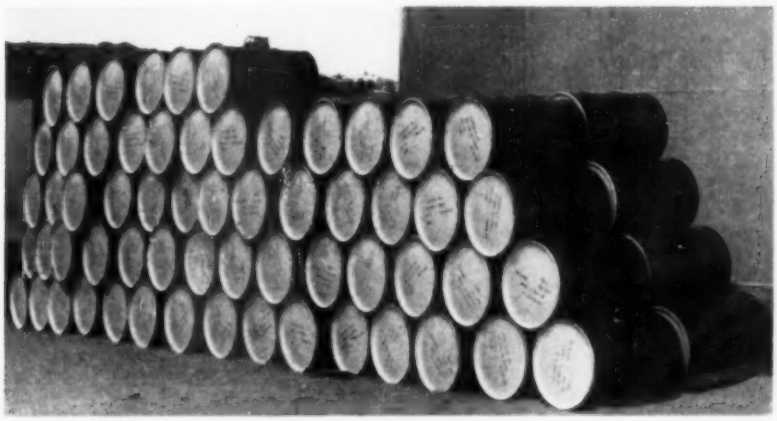
set at 2-in. clearance, which reduces all the oversize material.

There are many conglomerate pebbles which are not crushed. The incoming material is ground in a 6 x 6-ft. ball mill to fine consistency and the conglomerate pebbles are rejected via a trommel screen.

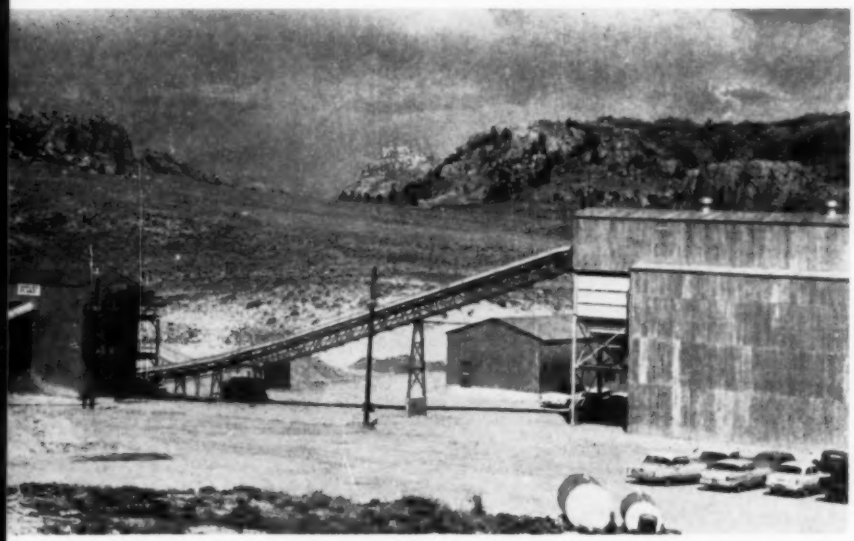
Next step in purification is the leaching section, where sulphuric acid and manganese dioxide form a leaching solution. From that point the material passes to four Esperanza drag classifiers, with all stages cycloned, where the sands are washed and rejected. The cycloned No. 1 drag overflow fraction, a fine product passing a 325-mesh screen, forms the ion exchange feed. The leaching process is so efficient that it extracts from 92 to 95% of all possible uranium in the material. Material passing the ion exchange circuit also goes over a trap screen to remove tramp materials.



Here are Technical Supt. P. N. Thomas (left); Geologist Eric Neuman; Wyoming State Inspector of Mines Alex Pascoe; Engineer Donald Cenis; and Manager J. W. Joyce.



End of the line for dried, pulverized uranium is shown here as the material is stacked in barrels for shipment. Later, it is further purified and processed by the AEC.



The resin in the ion exchange circuit absorbs the uranium. This resin is exposed to the uranium until it is saturated. The uranium is then de-absorbed with an acidified nitrate solution. Incoming material containing .5 to 1 gram per liter of uranium is concentrated to 10 grams per liter. The concentrated solution, known as pregnant eluate, passes to storage. Later it is clarified in sand filters and is precipitated at a pH of 7.0 with magnesium oxide. The uranium slurry is pumped to a thickener which concentrates it still further by making a liquid separation. Underflow from this thickener is filtered, dried, barreled and shipped as a mustard-yellow dust to the Atomic Energy Commission's marketing center at Grand Junction, Colo. Later on, it is purified and changed at other places in the United States to form part of the American atomic stockpile.

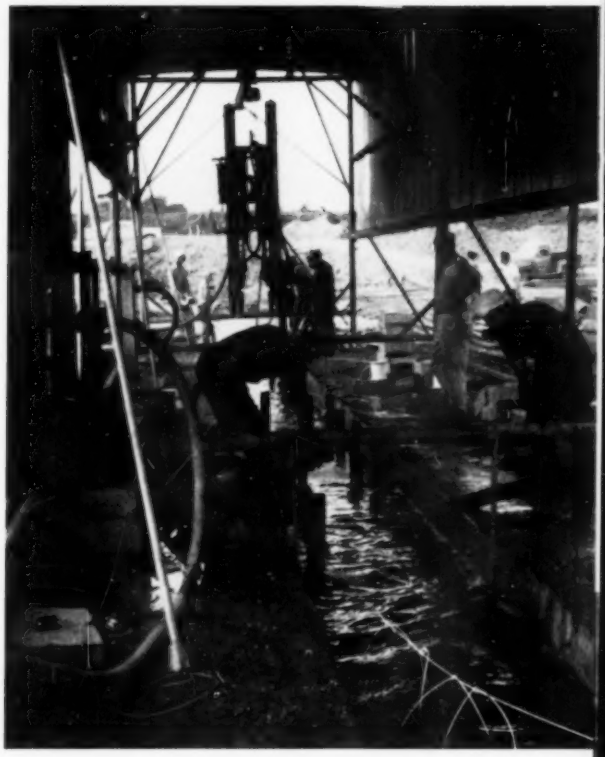
The thickener overflow, containing valuable chemicals, is returned to the makeup section and is reused.

Personnel

Western Nuclear Corp. is headed by R. W. Adams, president, and F. D. Griffin, vice president and treasurer, at the Rawlins executive offices. Directing the Loma Pit and Jeffrey City Mill operation is J. W. Joyce, resident manager. He is assisted by P. N. Thomas, technical superintendent; M. H. Smith, mill production superintendent; Eric Newmann, chief geologist; Marcel Cenis, mine production superintendent; and Donald Cenis, mining engineer.

Hydraulically - operated HD-21 dozer blades stone flat to make path for pipecradling rigs.

(Below) Working far out in the river, a ¾-yd. P & H 255A clamshell brings up rock and mud.



(Right) Barge is specially rigged for underwater drilling of blast holes. Crews wire holes with detonating cord prior to a shot. (Below) Opening up the ditch, a ¾-yd. hoe casts rock.

Pipeline Crosses River Via Rock Embankment

BIGGEST pipeline job in the eastern United States is the 440 miles of 14 to 24-in. products line being built by Laurel Pipeline Co., Harrisburg, Pa. The $50 million project runs across Pennsylvania and northeastern Ohio from Philadelphia to Cleveland. It provides a means for sending oil products from refineries located on the Delaware River near Philadelphia to the domestic markets of Cleveland.

Laurel Pipeline is owned by Gulf Oil Corp. with a 40% interest; Sinclair Pipeline Co. with 35% interest; and the Texas Co., 25%. Gulf is directing work of all contractors on the line as agent for the group.

Route of the pipeline crosses the Appalachian Mountains hilly sectors of the Keystone state and dozens of sizable rivers and streams. One unusual water-crossing was the job of Pipeline Maintenance and Construction Co., Camp Hill, Pa., and Charleston, W. Va. The firm recently installed almost a mile of 24-in. diameter pipe across the Susquehanna River near Harrisburg, Pa.

The river at this point was 3,800 feet wide and from 6 to 10 feet deep. Contract specifications called for encasing the pipe in concrete and placing it at a safe depth in the rocky river bottom. Weight of the concrete-coated pipe was 330 pounds per lineal foot. To accommodate it, Pipeline Maintenance and Construction Co. had to blast out a long ditch 12 feet deep and 6 feet wide between the river banks.

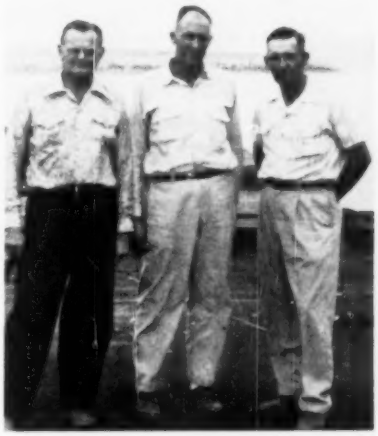
A drilling barge was rigged up by the contractor out of two 50-ft. barge sections. The floating sections were fastened together with steel tubing as shown in the photo on page 28. A 4-ft. space was provided between sections to permit underwater drilling. Two Chicago Pneumatic GTD-450 Trench drills with 4½-in. drifters were then mounted on an overhead gantry running the length of the drilling barge. Suspended on this gantry, the drills were able to put down blast holes at any point along the length of the barge. Air power was provided by three Gardner-Denver 600-cfm compressors.

Underwater Drilling

Holes were drilled from the barge on 48-in. centers to the required 12-ft. depth. About 35 pounds of water proof explosives were loaded into each hole. The drilling crews averaged 200 lineal feet of ditch per 10-hour day during the crossing.

After shooting the rock, Pipeline Maintenance and Construction Co. opened up the ditch with a pair of Bucyrus-Erie ¾-yd. 22-B hoes which cast the material to one side forming a temporary causeway out into the river. Two Allis-Chalmers HD-21 hydraulic dozers and a P & H ¾-yd. model 255A clamshell assisted with the rock.

Pipe cradling operations then moved out on the rockfill. Five HD-21 tractors with sidebooms were used to lower the pipe into the ditch. Three 40-ft. sections of pipe were joined together on shore and were carried out into the river by the sidebooms for welding and positioning. All joints between the 120-ft. sections were cleaned, doped, wrapped and concreted before being lowered in.



On job are R. B. O'Neal (left), vice president; Curt Steepleton, spread foreman; and Dick King, master mechanic.

Besides the dozer and excavator equipment, the pipelaying spread included a welding barge and a dope barge and X-ray machine barge combined.

Personnel in charge of the operation were G. B. Pace, president of Pipeline Maintenance and Construction Co.; R. B. O'Neal, vice president; Curt Steepleton, spread foreman; and Dick King, master mechanic.

Both Pace and O'Neal have had many years experience in pipelining in Pennsylvania, West Virginia and bordering states. O'Neal, in fact, has taken part in pipeline crossings of the Susquehanna in 1931 and 1935. The location of the latest river crossing for Laurel Pipeline is within a mile of the previous crossings.

Allis-Chalmers HD-21 sideboom tractors lower the concrete-encased 24-in. diameter pipe into river. Pipe section is 120 feet long.

Modern Dixie Quarry Processes Granite Gneiss

Weston & Brooker Company's Ruby plant near Macon, Ga., is one of South's newest and most modern. Push-button controlled plant has a 500-tph capacity. Two 3-yd. shovels supply it.

A MASSIVE seam of hard, abrasive granite gneiss provides the raw material for one of Dixie's newest, most modern quarry plants—the Ruby operation, near Macon.

The Ruby plant began production in May 1957 as the fourth operative plant of Weston & Brooker Co., Columbia, S.C. Weston & Brooker's other quarries are at Columbia and at Camak and Granite Hill, Ga.

Maximum production of the Ruby plant is 500 tons per hour. "We produce stone meeting all specifications for federal, state and private requirements," *Excavating Engineer* was told by Douglas Castleberry, Ruby's young and busy superintendent. "Our loading facilities are such that we can separate and blend any reasonable specification. All final loading is push-button controlled from the loading head. A tunnel leads under the stockpiles, and there's a Syntron feeder under each primary size."

The Ruby quarry seems likely to be a prolific producer. Ruby personnel have been unable to drill to the bottom of the granite formation. Weston & Brooker currently owns 200 acres of land and leases another 200 acres for the Ruby operation.

"What we have here," Castleberry continued, "is a metamorphic granite gneiss, which is very hard and abrasive. It ranges from fine to coarse grain and is light in color, containing a mixture of eight grays, pinks and whites. Its Los Angeles rating is 22."

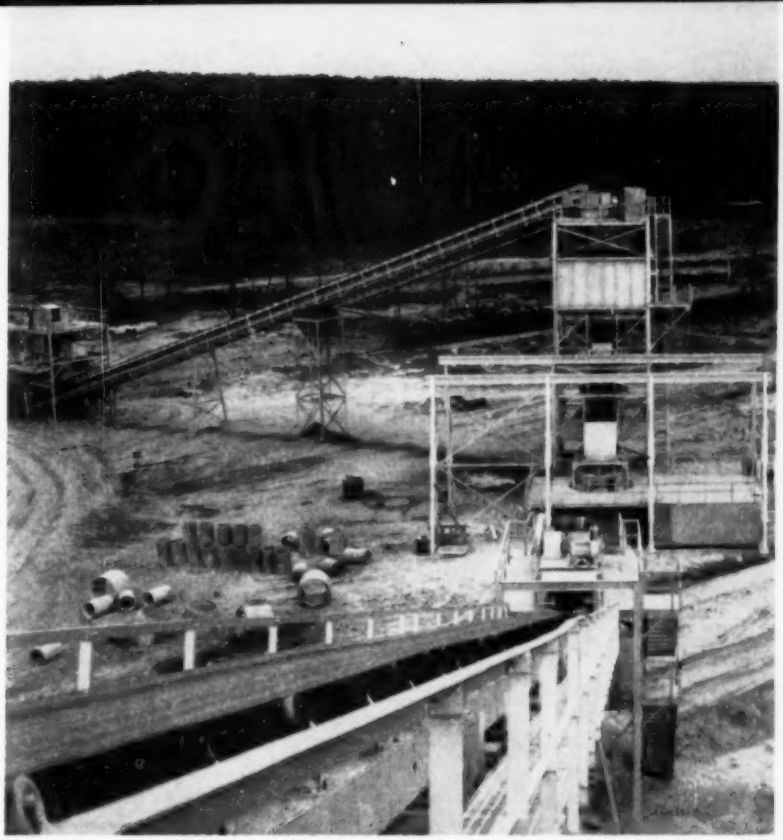
Drilling Setup

Plans call for quarrying a 40-ft. vertical face. Two Joy TM500 drills, using 2-in. steel and 4-in. Brunner & Lay carbide-tipped bits, put down blast holes on a 12 x 12 pattern. Two Ingersoll-Rand 600 Gyroflo compressors supply air. Average bit life is 475 feet, with resharpening every 45 feet. Resharpening facilities are mounted on compressors.

After traveling up an 8% grade from the quarry floor, truck end dumps load into 48 x 20 Pioneer feeder which supplies an Allis-Chalmers 48 x 60 jaw crusher.

Blast holes are bottom-primed with 60% semi-gelatin dynamite. Bulk of the dynamite employed is 40% ammonia. Millisecond delay electric blasting caps are used. One pound of dynamite brings down 2.75 tons of rock. Fragmentation is excellent, Castleberry said. The small amount of secondary drilling is done by hand-held Copco drills.

A 3-yd. shovel loads plentiful supply of rock into 18-ton Euclid 80FD. Large pieces at right are cast aside for secondary drilling.



Stone from the primary crusher (left background) is conveyed to a 7-ft. Symons cone crusher at the secondary station. Conveyor in foreground leads to bridge.

All loading of blasted rock is handled by two Bucyrus-Erie 3-yd. 71-B diesel-powered, torque converter equipped shovels. Both have General Motors 6-110 engines and Torcon torque converters.

The first 71-B was delivered in October 1956, and it helped to pioneer the site. The second 71-B was added in June 1957. During construction of the plant, shovel booms of the two excavators were utilized for crane work at times.

Create Sump Pit

When *Excavating Engineer* visited the Ruby quarry, the two 71-B's were loading side-by-side while driving a 12% incline to create a sump. "This is a bottom quarry opened up in a low area," Castleberry explained. "Therefore, we have a continual seepage problem. The sump we are constructing—it will be 250 feet wide and 42 feet below the quarry floor at the deepest—will allow us to remove seepage easily with an automatic sump pump."

The 71-B's load into four Euclid 80FD rear-dumps and one Mack model LVX rear-dump, all powered by Cummins engines. A Caterpillar D7 tractor patrols and cleans the loading area and haul roads.

Shovel oilers act as spotters for the operators and throw away loose rock. Larger rocks are cast aside by the shovel for secondary drilling later. Oilers at Ruby spend some time each day at the shovel controls under the quarry's program to train future operators.

"Our shovels have done a nice job for

View of plant shows how stockpiles are fed by storage bridge 300 feet long and 50 feet high. A shuttle conveyor serves both sides of the bridge and permits placing of material automatically at any point over a concrete 8 x 8-ft. reclaiming tunnel.

A 40-ft. face is being drilled at Ruby quarry. Two Joy TM500 drills, using 2-in. steel and 4-in. Brunner & Lay carbide-tipped bits, put down blast holes on a 12 x 12 pattern.

us; we've had a minimum of down time," Castleberry said. "We lube and grease continuously. Changes of oil and filters are done according to a regular schedule; when its time to change, we shut the machine down on the spot and make the changes. We follow the same schedule for our trucks and other rolling stock."

Ruby's maintenance personnel rebuild shovel dippers as necessary with manganese steel strips. A third dipper is kept as a spare. The quarry is experimenting with different types of dipper teeth. (Ruby does most of its own maintenance. A shop building is under construction.)

When necessary, the 71-B's remove overburden on weekends. The overburden is disposed of on property where no future quarrying is planned. Average depth of overburden in the first area opened was eight feet. The remaining area is expected to average between 15 and 20 feet.

The shovels return to the quarry floor on weekdays to load the trucks with blasted rock for the crushing plant. The trucks now are hauling about 1,000 feet up an 8% grade to dump their loads into the 48-in. x 20-ft. Pioneer feeder which discharges into an Allis-Chalmers 60 x 48-in. blake-type jaw crusher. The feeder has Oro manganese steel pans.

Secondary crushing is accomplished by a 7-ft. Nordberg Symons cone. A 5½-ft. Symons short-head fine reduction crusher is utilized for tertiary crushing. With two exceptions, all of the plant's screens are Allis-Chalmers 5 x 14-ft. Ripl-Flos. A 5 x 12-ft. single deck

Supt. Douglas Castleberry runs the Ruby plant which can meet any size spec.

Rock fragmentation is excellent and the few pieces that ride out the blast are drilled for secondary blasting by crews using hand-held Atlas-Copco pneumatic drills.

Ripl-Flo screen is used at the rip-rap station; a 5 x 12 Allis-Chalmers ROM screen, located just above the secondary crusher, removes and by-passes minus 3-in. material.

The storage bridge is 300 feet long and 50 feet high. By-passed material from the ROM screen and material from the 7-ft. Symons are combined and delivered to the center of the storage bridge on a 36-in. belt. A shuttle conveyor serves both sides of the bridge and permits an operator to deposit material automatically at any point over an 8 x 8-ft. pre-fabricated concrete tunnel. A variable-drive feeder designed by Weston & Brooker accepts material

Shovels load side by side on 12% incline being driven to create a pit for drainage. Sump will be 250 feet wide and 42 feet deep.

into the tunnel through gates with clamshell-type doors. Material is conveyed from the reclaiming tunnel to the scalping station.

The 5½-ft. Symons short-head fine reduction crusher draws by gravity the over size from the scalping screens. Material through the scalping screens is conveyed to the screening towers. Two separations are made at each station—one to storage under the tower and the other to storage midway between towers. A rubber-tired Michigan 125A loader stockpiles stone in additional piles adjacent to the screening bridge.

A Syntron feeder under each primary size permits an operator at the loading head to push a button and blend sized material on a conveyor belt in either tunnel. The blended material is delivered to the loading head. Before delivery to truck or railroad car, material is washed over a 5 x 12 single deck vibrating screen and automatically weighed by a Builders Providence Conveyo-Flo conveyor scale.

Highly Mechanized

The plant utilizes 30 conveyors with Goodrich or U.S. Rubber belts ranging in width from 24 to 42 inches. Continental Gin Co. made the idlers; Falk Co., the gear reducers. Totally-enclosed, fan-cooled Allis-Chalmers motors are used throughout the plant. All of them utilize 550 volts. Power is supplied by the Georgia Power Co. A transformer station is located on the plant grounds.

In the early days of the Ruby plant, a P&H 7½-ton electric hoist suspended from a Marion crane unblocked the jaw crusher. The crane has been replaced by a 40-ton guy derrick.

The Ruby quarry supplies points in south, east and central Georgia. A siding of the Central of Georgia Railroad serves the plant. Some material is moved by truck.

Approximately 85 persons are employed at Ruby. One 50-hour shift weekly is allotted for shovels, trucks, and the primary and secondary crusher. Loading of finished stone, tertiary crushing, final separation in the screen house, and primary drilling require two 45-hour shifts.

Luther J. Burris, Weston & Brooker's vice president of operations, designed and directed construction of the Ruby plant. His staff included Castleberry; J. M. Pruden, structural design engineer; and Charles Grinstead, assistant superintendent.

Among Ruby personnel are: Luther Carden, general quarry foreman; Morris Grinstead, master mechanic; Carl Thomas, plant foreman; William Colvin, loading foreman; C. E. Hannah, office manager; and James Reardon, plant purchasing agent.

W. S. Weston, Jr. is Weston & Brooker's president. Richard Simons is vice president and general sales manager.

The Ruby plant is named for a 40-year employee of the home office in Columbia, Mrs. Ruby G. Layton.

Maintenance of stockpiles is handled by this Michigan 125A rubber-tired loader.

Road To Rochester Gets New Look

Contractor ramrods grading of double barreled federal-aid primary route into Rochester, Minn. Marsh excavation requires 8-ft. deep layer of rock fill to provide solid roadway foundation.

Fleet of Cat No. 456 scrapers, pulled by DW20 wheel tractors, were brought in to open up the federal-aid primary route.

NARROW, twisting, steep-graded U. S. route 14 between Byron and Rochester, Minn., is being replaced by a four-lane divided highway capable of handling with ease and safety an increasing flow of traffic into the world famous city of clinics and hospitals.

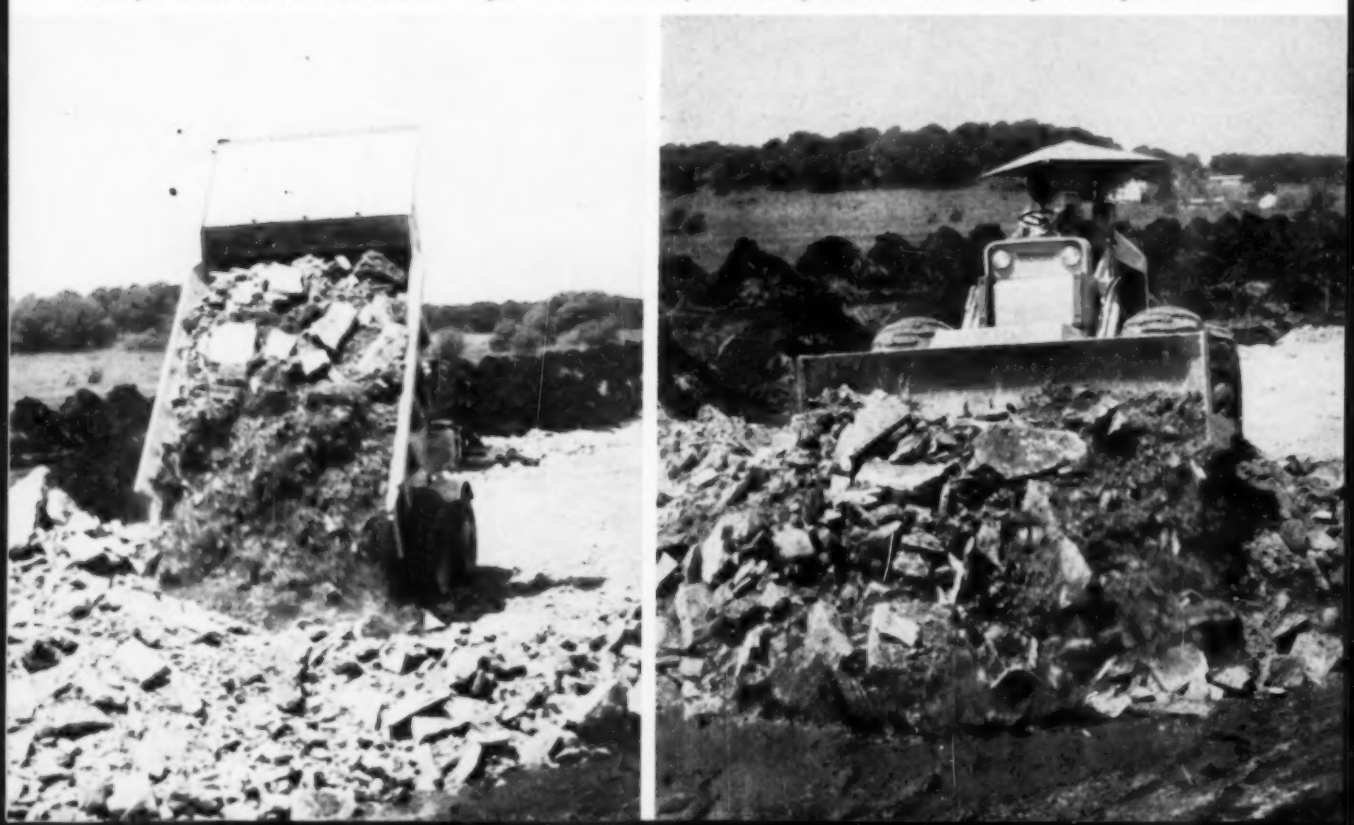
The new 8.9-mile stretch of highway will eliminate travel over a route long recognized as a traffic hazard. Straightening and widening route 14 from its junction with U. S. 52 in Rochester westward to Byron has for some time been on the books of the Minnesota state highway department. Plans became a reality last spring. The road is being constructed as a federal-aid primary route with the federal government and state sharing the cost on a 50-50 basis.

Soon after funds for the highway 14 project were appropriated, a grading contract was let by the state highway commission and bid successfully at $1.1 million by Alley Construction Co., Faribault, Minn. Contract specifications call for a divided highway with a broad right-of-way—requirements which are presenting challenging problems to the Alley firm. About ½ to ¾ of a mile of the relocation passes through marshland that has an average 3-ft. thick top layer of peat which must be excavated down to clay hardpan to give a solid roadway foundation. In addition, the marsh is a low lying area requiring 5-ft. elevation above present ground level along the right-of-way so the highway will not become inundated during spring thaws or in periods of heavy rainfall.

Engineering estimates place roadway fill requirements in the marsh at 450,000 cubic yards. Fill material is being obtained from a 70-ft. deep, 1,300-ft. long right-of-way cut containing limestone, shale and St. Peter's sandstone, excellent borrow for this area because it will not soften when coming into contact with water.

Another significant job factor is an exceptionally long haul from cut to fill dump site. It averages 6,200 feet. Haul-

Michigan model 280 rubber-tired dozer (right) levels rock dumped at fill by Euclid (left). Haul length averages 6,200 feet.



Alley's 2½-yd. shovel has bailed up to 4,000 yards of rock per day from a 70-ft. deep, 1,300-ft. long cut. It has a 337-hp turbo-charged Cat engine and Torcon converter.

ing chores have been assigned three 18-yd. and two 22-yd. Euclid end-dumps, which waste no time in covering the more-than-a-mile haul distance. With full loads they barrel down haul roads at speeds up to 30 mph and have dumped 90 loads of material in 5½ hours, each unit making 18 round trips.

In addition to swamp and rock excavation, Alley's contract calls for 1,091,756 yards of common excavation, most of which lies in gently rolling countryside. It is chiefly dozer-scraper work and has no special handling problems.

The stretch of U. S. route 14 being rebuilt will consist of a pair of divided highways, each with 24-ft. travel widths and 10-ft. shoulders. A maximum 45-ft. median strip will separate the lanes of traffic, and the right-of-way will average 225 feet wide. When grading is completed, a 3-in. thick layer of sand and gravel sub-base will be put down, followed by a 3-in. thick layer of gravel base course. This work has been subcontracted by Alley to Hodgeman & Sons Co., Fairmont, Minn. A contract for hard surfacing the highway will be let by the state sometime during 1959, at which time paving specification will be made known.

Dig Peat

To assure a solid roadway foundation, peat in the marsh area is being dug down to hardpan on a 36-ft. wide basis for each lane of the highway. This excavation is being handled by a Lima Paymaster dragline with 45 feet of boom and a 1-yd. Hendrix swamp bucket. Working from timber mats, the Lima digs about 300 linear feet a day and swings the material into spoil piles along both sides of the right-of-way, where it is left to be baked dry by the sun. Later the spoil piles will be leveled to form the roadway's shoulders.

A cross section of rock being loaded out of the cut shows a 20-ft. deep cap of limestone, followed by a 4 to 8-ft. thick layer of shale. Below this is St. Peter's sandstone. Drilling blast holes in this material has been assigned two Gardner-Denver model 99 jumbos on the front of a high-output Cat D8 tractor. Air power is supplied by a Gardner-Denver WH600 compressor, mounted just back of the operator's seat on the D8. This arrangement provides a completely mobile drill unit, which is essential here because all equipment must be moved out of the cut prior to shooting.

The model 99's bore a 2½-in. hole with Timken carbide-tipped steel bits, which are sharpened on the job three to four times, then discarded. An 8 x 8-ft. drill pattern has produced such good

Working from timber mats, Lima Paymaster with 1-yd. swamp bucket casts peat into spoil piles along right-of-way. Material will be leveled to form road shoulders.

fragmentation that no secondary drilling is necessary. Hole depth is 16 feet in limestone and 22 feet in shale and sandstone. The Gardner-Denvers drill about 2,000 feet a day.

Blasting is done twice a day, once in the morning and again toward late afternoon hours when the day and night crews change shifts. About ¼-lb. explosive is used for every yard of broken rock produced. There are 115 holes to an average shot, bringing down some 3,000 yards of material.

Drilling Methods

Two methods of hole loading are used. Holes in the wet are filled above water level with 2 x 16 or 2 x 24-in. sticks of Hercules 60% gelatin-type dynamite. Ammonium nitrate prills are poured to the hole's halfway mark, and more dynamite is added to provide a booster charge. Nitrate prills are then loaded to within approximately 5 feet of hole collar. In dry holes, the nitrate is filled to the halfway mark, a few sticks of dynamite are added and, again, nitrate poured to within about 5 feet of hole collar.

Shots are set off by electric blasting caps. Primacord is used where holes are not too deep. In these cases, standard caps, set to millisecond delays, are used for detonation.

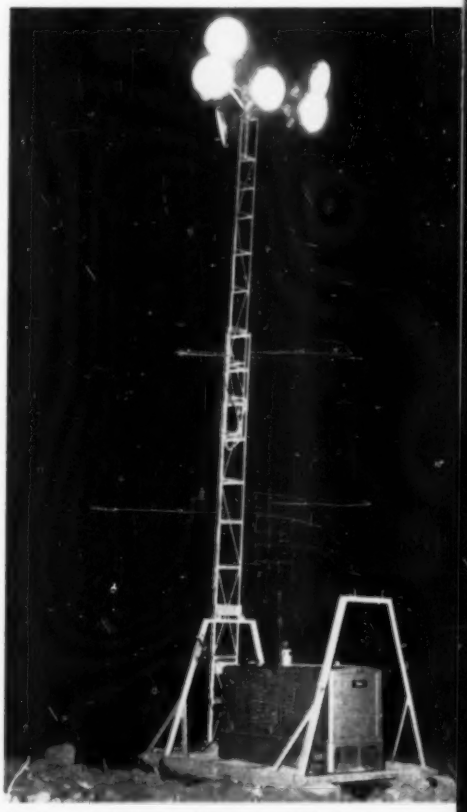
Hard rock digging in the cut is being speeded by a 2½-yd. Bucyrus-Erie 54-B shovel. It has a 337-hp turbo-charged Cat engine and a Torcon torque converter. The machine has bailed up to 4,000 yards of rock per day, tops for this kind of work, according to Lloyd Parker, Alley's general superintendent. "That's about as fast as a 2½-yd. shovel can dig and swing," said Parker, "in such material."

Equipment on the route 14 project had to be carefully chosen as to versatility and usefulness because the Alley firm is presently working other contracts in Minnesota requiring large spreads. In addition to the Euclid end-dumps, the 54-B, Lima Paymaster and Gardner-Denver jumbo drills, low-haul scrapers and tractor dozers were initially brought in to open up the job, but these were soon needed elsewhere.

A Michigan model 280 rubber-tired dozer, powered by a 300-hp Cummins diesel engine, levels out rock dumped at the fill by the Euclid end-dumps. It is also used for heavy clean-up work in the cut following a shot. The model 280 can cover fill to cut distance in much less

Continued on page 41

Cat No. 12 motor grader cleans up broken rock in the cut following a blast as a Euclid end-dump moves in for a load of fill. At right background is part of completed grade.



Loading and dump sites are lighted at night by 10-kw Onan generating plants. Each has six 1,500-watt G-E floodlights.

Workmen assemble forms for a 10 x 6-ft. box-type culvert which is 173 feet long. Concrete for structure is hauled in by R190 Internationals with 6-yd. Smith mixer.

1959, experts say, will usher in the greatest period of construction in history. How will you do in this era of tremendous growth? The answer depends in large measure on your machines. Their performance determines your profit. Caterpillar's research and development program in this period will continue to provide the best possible earthmoving machinery.

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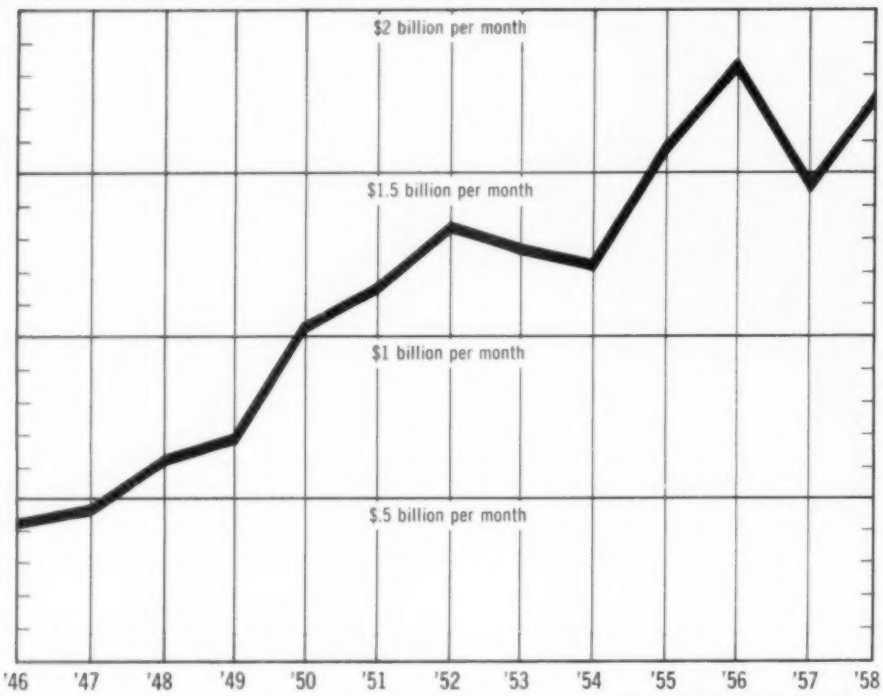
CATERPILLAR RESEARCH AND DEVELOPMENT

A multi-million-dollar research and development program at Caterpillar Tractor Co. is paying off for you in the most productive earthmoving equipment ever manufactured. It's PROJECT PAYDIRT—the big news in the construction field today.

Caterpillar research consistently has been first with the major developments in earthmoving equipment. Each development has meant more production and more profit for owners of Caterpillar machines.

Since 1946 the money spent on heavy construction

GROWTH IN U. S. HEAVY ENGINEERING CONSTRUCTION



Source: *U. S. Dept. of Commerce*

SHARP INCREASE of money spent in U.S. on heavy engineering construction, both public and private, is shown in this graph. In 1946, a monthly average of $431 million in heavy engineering construction contracts was let. In the first eight months of 1958, contracts averaged nearly $2 billion ($1,717 million). By 1975, average monthly contracts of approximately $3.5 billion are expected.

HERE'S WHAT *PROJECT PAYDIRT* MEANS TO YOU!

As the amount of construction increases, more contractors will enter the field, and competition for the work will be intense. Machines may be the difference between profit and loss. There will be no place for anything but modern, heavy-duty machines—machines that can perform *profitably*, day in and day out, under severe conditions.

Caterpillar has these machines, a full line of quality, job-tested earthmoving equipment. And PROJECT PAYDIRT insures that the Caterpillar line will always be ready for the job ahead, regardless of changing conditions and demands. Proof of this lies in the past record.

Since the end of World War II the Caterpillar line has experienced a continuous growth. And in 1951 the DW20 and DW21 were introduced. These wheel-type tractors soon proved ideal power units for scrapers. Also from PROJECT PAYDIRT that year: the No. 90 Scraper, top producer with track-type tractors; and the HT4, a track-type, hydraulic front end loader.

The workhorse D8 Pusher, designed especially for push-loading applications, was introduced in 1953, along with

Paydirt

PACE GROWTH IN HEAVY CONSTRUCTION

in the United States has more than doubled. By 1975, experts predict, it will more than double again. Between now and then may well lie the country's greatest era of construction.

PROJECT PAYDIRT is Caterpillar's answer to the challenge of this explosive growth in heavy construction.

Money spent on heavy construction in U. S. has risen since 1946 from $5,172,000,000 to more than $20 billion. Experts predict that by 1975 annual expenditures will rise to more than $40 billion.

the No. 6 Shovel and the DW15, a smaller four-wheel tractor. 1955 brought the massive D9, king of the crawlers, equally effective as a bulldozer or for pushloading scrapers.

Also in 1955 came the three Traxcavators (Nos. 977, 955, 933), and the LOWBOWL Scrapers (Nos. 470, 456, 463), top producers that competitors still are trying to duplicate.

The Oil Clutch began setting new long-life standards in 1955. Also introduced in that year were other LOWBOWL Scrapers (Nos. 428, 435, 491), and tractor-mounted hydraulic Rippers (Nos. 4, 6, 8, 9).

In 1957, the Side Dump Bucket was offered as an attachment for the No. 955 Traxcavator, resulting in greater production through in-line loading. In the bulldozer line, the revolutionary Gyrodozer for the D7 Tractor began its career as the most versatile blade yet developed. PROJECT PAYDIRT was producing the equipment to match the growth in engineering construction.

The new Dry-Type Air Cleaner for the D9, DW20 and DW21 was introduced last month. This air cleaner removes 99.8% of all dirt in the intake air. And it requires only 5 minutes instead of the 20 formerly required to service the oil-type cleaner. That's 15 minutes more production time at each service period.

AND NOW CATERPILLAR'S **PROJECT PAYDIRT** **BRINGS YOU...**

LIFETIME LUBRICATED ROLLERS AND IDLERS

- **No routine servicing!**
- **Outwear conventional rollers and idlers!**
- **Feature new leakproof seals that can be re-used!**

Three million test hours under the toughest conditions prove this fact: new D9 lifetime lubricated rollers and idlers have no equals for low-cost, trouble-free performance.

Lubricated in the factory, they never need servicing again until they are rebuilt. They last far longer with less maintenance than conventional counterparts. Their new seals are leakproof and can be used again and again.

These outstanding advantages are the direct result of Caterpillar's new, exclusive concept in roller seal design—a metal to metal, floating ring seal.

Important as the new seal is, it is only one of many major improvements in the new D9 track roller. Major changes have also been made in rim, hub, bushing, outer sleeve bearing, roller shaft, end collars and lubrication system. These advances greatly extend roller life and effect substantial savings when rebuilding is necessary. See your Caterpillar Dealer today. He has the full story on what the new lifetime lubricated roller can mean to you.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

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BORN OF RESEARCH... PROVED IN THE FIELD

General Superintendent Lloyd Parker (left) talks with Merle Alley, president of Alley Construction Co., on the job site.

Alley . . .

Continued from page 36

time than a tracked vehicle. Piling up material at the cut is thus avoided, enabling the 54-B to move in shortly after a blast and start its loading swings. Nor must the Eucs wait at the fill site for adequate dump space. A Cat No. 12 motor grader maintains smooth haul roads and does some clean up work in the cut, plus miscellaneous tasks.

When work on the right-of-way reaches its peak, Alley plans to have on hand a large, fast-moving spread of 11 Cat DW20 scrapers; three Euclid S-18 scrapers; three Euclid TC-12 push cats; one D9, a D6 and six D8 Caterpillar tractors; a 4-yd. Michigan model 275A front-end loader and a 15-ton Lorain Moto-Crane, in addition to equipment now being used.

Work Two Shifts

A 120-working day completion deadline has made it necessary to ramrod the job with day and night crews, each working a 10-hour shift, six days a week. Night operations have been speeded by lighting both loading and dump sites with 10-kw Onan electric generating plants, specially rigged to Alley's specifications by Wm. H. Ziegler Co., Minneapolis, Minn. They are 115-230 volt, 60-cycle, single-phase, three-wire units powered by four-cylinder Continental gasoline engines. Each unit has six 1,500-watt General Electric weather-proof adjustable floodlights and a light tower that can be extended to 30 feet.

In addition to right-of-way grading, Alley's contract calls for constructing a single 10 x 6-ft. box-type culvert 173 feet long and a triple 10 x 6-ft. culvert 140 feet long. Ready-mix concrete for these structures is being delivered from a nearby plant of the Rochester Materials Co. in 6-yd. Smith mixers mounted on R190 International trucks.

A good preventive maintenance program has kept Alley's equipment rolling since the job began, even with a work schedule making rugged demands on the machinery. Individual operator checks are made three times a day without fail. Two lubricating trucks are owned by the firm. They make rounds regularly to give chassis lubrication and make oil changes.

Six 28 to 32-ft. long portable maintenance shop and storage vans can handle all repair work on the job site. Lay work and major equipment overhaul, however, are done at the firm's headquarters in Faribault.

The highway project is being hurried to completion with the smoothness and precision marking other Alley jobs, and there have been some big ones. The 13-mile long U. S. route 61 task between Red Wing and Lake City, Minn., is a good example. According to Lloyd Parker, "it had lots of swamp excavation, numerous fills and we were faced with constant traffic congestion."

The Alley firm always manages to keep busy during summer construction months. It recently finished a road project at Winona, Minn., involving 200,000 yards of rock work plus material containing a combined total of 500,000 yards of muck and boulders. It is holder of the grading contract for moving nearly a million yards of earth at Wold-Chamberlain Airport in Minneapolis-St. Paul and will begin a 6-mile long, $1 million job from Lake City, Minn., south on state route 63, when grading on highway 14 is about completed.

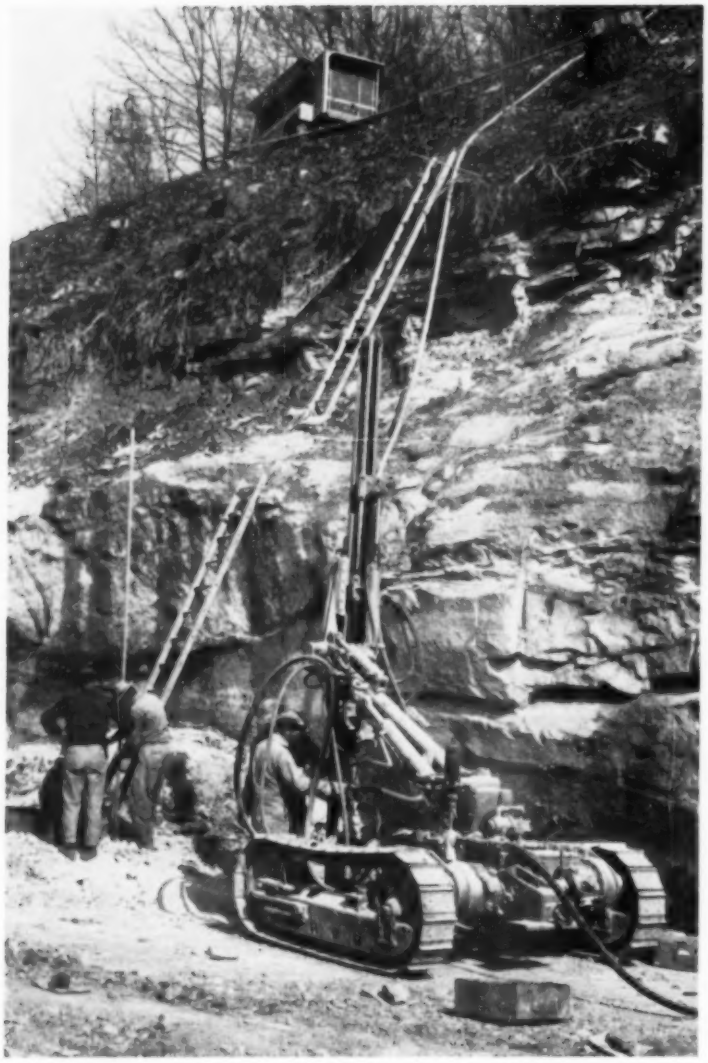
Alley does most of its work in Minnesota. Contracts have been held in other states, but "we like to stay as close to home as possible," said Parker.

Alley Construction Co. was founded in 1936 by Merle Alley, president, his father, A. L. Alley, vice president and Parker, who is secretary of the firm.

Les Paine is job superintendent on the highway 14 project and Martin Gardner is master mechanic. Resident engineer for the state is W. O. Swenson.

Tractor dozes material along right-of-way. Stretch of highway being rebuilt will consist of a pair of divided lanes, each with 24-ft. travel widths and 10-ft. shoulders.

Les Paine is Alley's job superintendent on the highway 14 project. His main objective is keeping ahead of schedule.



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CRAWL-IR

"It's a DRILLIN' FOOL"

says Jim Chase, superintendent for the Haynes Construction Co.

"Does as much work as three wagon drills — and at half the price!"

These are the comments of a veteran rock drill man. And when Jim Chase calls the CRAWL-IR a "drillin' fool," you can be sure his enthusiasm is well deserved.

The unit shown above is being used by the Haynes Construction Company of Bluefield, West Virginia, to do the rock work on a new highway for Charleston's Kanawha County Airport. But rough ground and deep cuts like this were no problem to the fully mechanized CRAWL-IR drill. In fact Jim Chase, superintendent of the job, reported that it easily out-performed three wagon drills—and at half the cost.

Supplied with 100 psi air from a 600 cfm I-R Gyro-Flo compressor, the CRAWL-IR moves from hole to hole under its own power. Five large, double-acting hydraulic cylinders control *all tower motions* at the touch of a throttle. You can set up to drill in any position in a matter of minutes. And the powerful D-45 drill, with reverse rotation, permits adding and removing coupled steels in a hurry.

Time formerly spent in moving the equipment, setting it up and changing steels is now spent *drilling rock*. You get more footage per shift with far less effort than ever before. Ask your I-R man for complete information on the time-saving, cost-saving CRAWL-IR drill and long-life I-R carburized drill steel and Carset bits. Or send today for a copy of Bulletin No. 4189.

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A CONSTANT STANDARD OF QUALITY IN EVERYTHING YOU NEED FOR DRILLING ROCK

Low-Cost Electrodes Simplify Hardfacing

New low-cost electrodes prove reliable for critical strength welds between two sections of 12 to 14% manganese plate or at junctions of alloy steel and manganese steel sections.

by W. L. Lutes and H. F. Reid, Jr.
Managers, Hard Surfacing & Technical Service Departments, McKay Co., Pittsburgh, Pa.

MANY equipment operators are rapidly discovering the advantages of building up and overlaying those wearing parts on their equipment which are subject to constant grinding and abrading action of daily work use. But many excavating contractors still think welding is simply a method of repairing equipment in the field, not a basic means to prevent repair and increase service life. Perhaps this is due in part to the rapid technological advancements being made by welding wire and electrode manufacturers.

These have concentrated on the development of welding wires and rods particularly designed for overlaying hard surfacing metals onto the wear sections of crusher rolls, dredge parts, crusher pads, dipper teeth and similar equipment—parts that bear the brunt of heavy-duty, everyday service.

At this point we will discuss certain elementary metallurgical data. A quick review of the types of steels, their inherent properties and chemical composition will give the man in the field a better understanding of the how and why of depositing hard surfacing layers through arc welding.

Alloy Plates

A good deal of basic equipment subject to severe impact is fabricated from austenitic manganese steel or alloy steel. Hadfield manganese and modified Hadfield austenitic manganese steels are noted for ability to resist the damaging effects of repeated impact and abrasive wear. This inherent toughness makes 12 to 14% manganese steels a suitable material for the wear sections of hammer mills, crushers, power shovels, dredging pumps and other types of heavy-duty equipment.

Equipment made from Hadfield manganese steel reduces, but seldom eliminates, damage caused by the severe service conditions generally associated with such machinery. The equipment must be reconditioned periodically; and the more severe the service condition, the greater the frequency of repair.

Arc welding and arc welding electrodes play vital roles in the care and reconditioning of these industrial work horses. Low-cost, nickel-modified and molybdenum-modified austenitic manganese electrodes and weld metals have proved satisfactory for many industrial applications.

Traditional Procedure

Traditionally, the use of modified austenitic manganese weld metals frequently was limited to the building-up of austenitic manganese wear sections. Premium-priced stainless steel electrodes were preferred for critical strength welds between two sections of 12 to 14% manganese plate or at junctures of alloy steel and manganese steel sections.

Stainless steel weld metal also was preferred as the initial overlay on carbon steel wear plates ultimately to be overlayed with additional layers of austenitic manganese weld metal.

Stainless steel weld metal was considered essential to prevent formation of a hard, brittle, crack-sensitive zone at the interface of austenitic manganese weld metal and alloy steel plate material.

Today, the use of stainless steel electrodes no longer is mandatory for the production of strong, ductile, crack-free welds. Critical strength joints and austenitic manganese overlays on alloy steel wear plates can be made directly by using relatively inexpensive composite nickel-manganese electrodes.

This article will cover the properties of weld metal deposited by the improved nickel-manganese electrodes. Hardalloy 118, developed by the McKay Co., Pittsburgh, Pa., is an example of such an electrode. Hardalloy 118 will be compared with conventional modified austenitic manganese and type 308 stainless steel weld metals.

To better understand the procedure and results obtained, a brief identification and descriptive review of a typical hard surfacing electrode would be helpful. The McKay Hardalloy 118 will be used as the example.

Hardalloy 118 electrodes are low hydrogen electrodes conforming to the new AWS-ASTM requirements for EFeMn-A electrodes. More specifically, Hardalloy 118 employs a highly alloyed coating to deposit weld metal which has good wear resistance and ability to take heavy impact on high alloy and manganese steels. The weld deposits are austenitic in structure, containing 12 to

Haul trucks are subject to tremendous impact and extreme abrasion. Welding manganese bars to the truck bed with new low-cost electrodes can solve problem.

Table 1. Materials Tested

Weld Metal	Analysis of Weld Deposit, % C	Cr	Mn	Mo	Ni	P	Si
Hardalloy 118	0.75	0.38	14.5	...	3.5	0.021	0.65
Conventional Nickel-Manganese	0.60	0.38	12.5	...	3.5	0.049	0.70
Conventional Molybdenum-Manganese	0.41	0.11	12.3	1.0	...	0.049	0.71
Type 308	0.06	20.0	2.2	...	9.7	0.027	0.70

14% manganese and approximately 4% nickel. The deposited metal is porosity free, crack free and extremely tough. As deposited, it has a hardness of up to 20 Rockwell C, but it work hardens rapidly under service to a Rockwell C value of about 50.

Composition of weld metal deposited by Hardalloy 118 electrodes lies within the range of composition normally referred to as nickel-modified austenitic manganese steel. Essential difference between the composition of this improved weld metal and conventional nickel-manganese weld metals is the alloy balance, with particular emphasis placed on control of minor elements.

Composition of the improved weld metal and materials used for comparative testing are summarized in Table 1.

Mechanical properties of four weld metals tested—Hardalloy 118, conventional nickel-manganese, conventional molybdenum-manganese and type 308—were determined using standard all-weld-metal tensile specimens similar to those used in a study of stainless steel weld deposits. Beveled edges of the groove joint were overlayed with the specific material being tested prior to assembly and start or preparation of the test specimen. This standard precaution was taken to eliminate or minimize dilution of weld metal in the test area from the plate material.

Results of these tests are summarized graphically in Fig. 1. The combination of strength and ductility exhibited by Hardalloy 118 weld metal was outstanding. Elongation of the improved nickel-manganese weld deposit was more than three times the ductility of conventional modified manganese weld metals tested. Tensile strength of the improved deposit was approximately 50% higher than that of any other material tested.

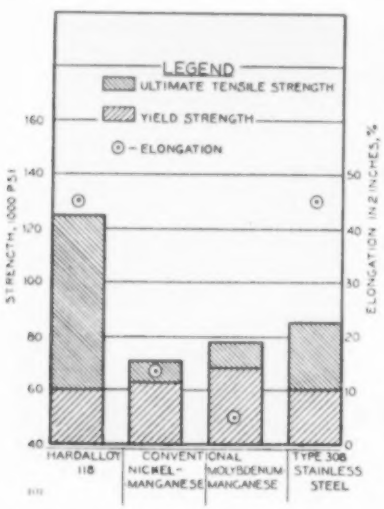


Figure 1. Graph shows properties of four all-weld-metal tensile specimens. Hardalloy weld metal shows an outstanding combination of strength and ductility.

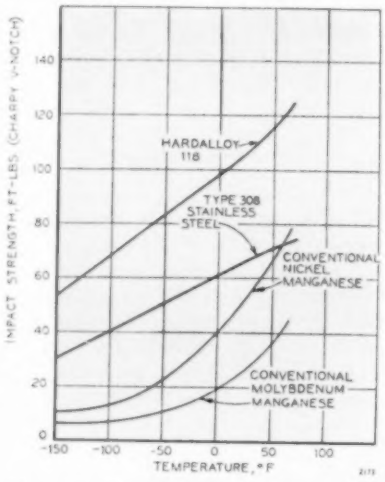


Figure 2. Charpy impact values of four basic weld metals are compared in this graph. The subzero impact strengths of Hardalloy are greater than other materials tested at room temperatures.

Impact strength and transition temperature of materials for the welding of 12 to 14% manganese steel may have limited application to many operators of heavy equipment. Such information, however, is of practical significance where operations are maintained at zero and sub-zero temperatures. Marked differences in impact strength of weld deposits used under such conditions vitally influence service life and productivity of earthmoving and crushing equipment.

Charpy (V-notch) impact specimens, prepared from weld metal deposited by each type electrode, were tested at selected temperatures ranging from room temperature to -150° F. The results are shown in Fig. 2.

Hardalloy 118 weld metal proved the most impact-resistant material tested over the entire testing range. At -50° F., impact resistance of this improved nickel-manganese weld metal was greater than that of the other materials tested at room temperature.

Crack resistance of an alloy is a property difficult to define and equally difficult to measure. The general term has a multitude of definitions. Tests for cracking have not been standardized to the point where results are accepted and understood, as in the case of a hardness reading. A number of cracking tests have been developed and used for specific studies.

Crack Test

The crack test used in this study originally was developed at the McKay Co. for use as a quality control test for individual lots of armor-welding electrodes. A modified version of the control test later was adopted as a standard requirement for qualification of armor welding electrodes. The test proved so sensitive to minor variations in composition of the weld deposit that its use was extended to more general studies of weld metal and weld metal cracking.

The test is shown in the cutaway view, Fig. 3. Relative crack-resistance of the alloy was estimated by the percentage of the total length of the weld that did not crack. Hardalloy 118 weld metal was the only material to pass this severe crack test. Cracking was limited to about ½ inch in the crater. Weld metal deposited by conventional modified austenitic manganese or type 308 stainless steel electrodes cracked the entire length of the test specimen.

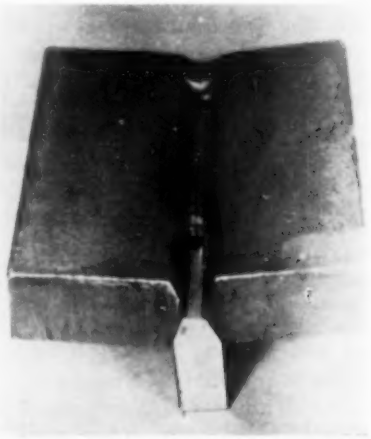


Figure 3. Cutaway view shows specimen that failed in the weld metal crack test. Note crack along the length of weld.

Ability to work harden and, at the

same time, resist excessive plastic deformation are two of the most important properties of any material for the welding of 12 to 14% manganese steel. Such steel and weld deposits must be capable of work hardening on the surface, yet retain a resilient, impact-resistant structure throughout the mass of the material. Surface hardening should develop quickly without excessive deformation of the original shape of the deposit. The ideal material, therefore, would be one which would work harden rapidly on the surface and deform only slightly under the force needed to develop this hardness.

Work hardening characteristics were evaluated by using cylindrical all-weld-metal specimens mounted rigidly, as shown in Fig. 4. Tip of the all-weld-metal specimen formed an anvil for the free falling hammer. The tip was struck with a force of 25 foot-pounds at a rate of 75 impacts per minute. Periodically, the calibrated specimen was removed from the equipment and its overall length remeasured. Difference in length was taken as a measure of the amount of plastic flow occurring under the conditions and duration of testing.

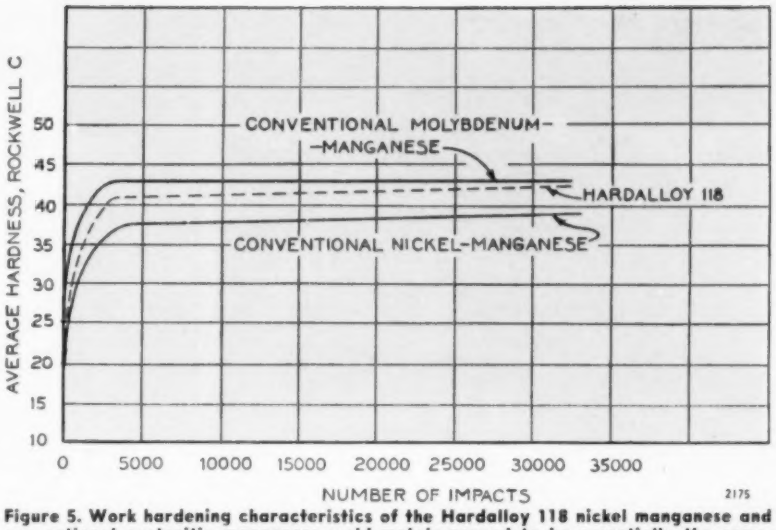


Figure 5. Work hardening characteristics of the Hardalloy 118 nickel manganese and conventional austenitic manganese weld metals proved to be essentially the same.

Work hardening characteristics of the improved nickel-manganese joining and surfacing metal paralleled those of conventional modified austenitic weld metals. A relatively small number of impacts was sufficient to raise the initial hardness of 20 Rockwell C to more than 40 Rc, Fig. 5. Hardness of the improved weld metal continued to rise slowly throughout the duration of the test.

Deformation of Hardalloy 118 specimens was approximately the same as that of conventional nickel-manganese specimens.

The overall properties of Hardalloy 118 weld metal appeared outstanding and impressive in the comparative testing program. Such results, however, had little commercial value unless these improved nickel-manganese electrodes could be used to simplify welding techniques required for many joint assemblies involving 12 to 14% manganese steel and to improve the general quality of the weld metal.

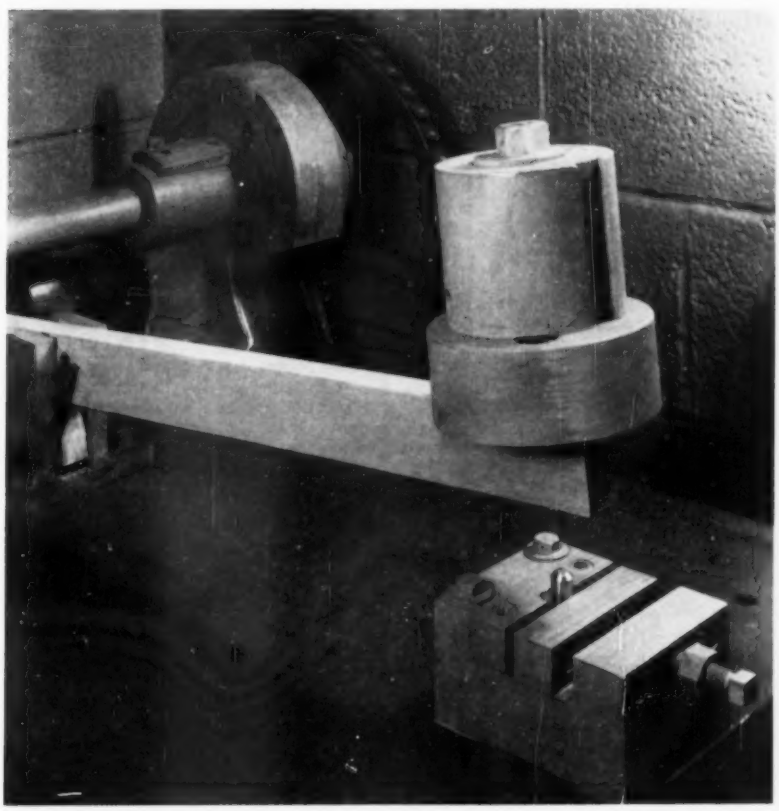


Figure 4. An impact hammer is used to work harden the all-weld-metal specimen. Tip of specimen is struck with a force of 25 foot-pounds at 75 impacts per minute.

Simulate Field Conditions

To this end, a series of butt welds were made simulating field conditions such as those encountered in fastening attachments to buckets, attaching pointer bars to bucket teeth and in the application of grouser bars, among other things. Welds were made joining two sections of austenitic manganese plate; welds were also made between sections of austenitic manganese and carbon steel plate. Normal welding procedures were employed. None of the welded assemblies were heat-treated prior to testing.

It should be noted that traditionally austenitic manganese electrodes were recommended to join carbon steel to austenitic manganese plate only if stainless steel weld metal was used as the initial or root pass. Similar restrictions were encountered in overlaying carbon steel plate with more wear resistant austenitic weld metal. Cracking at the interfacial

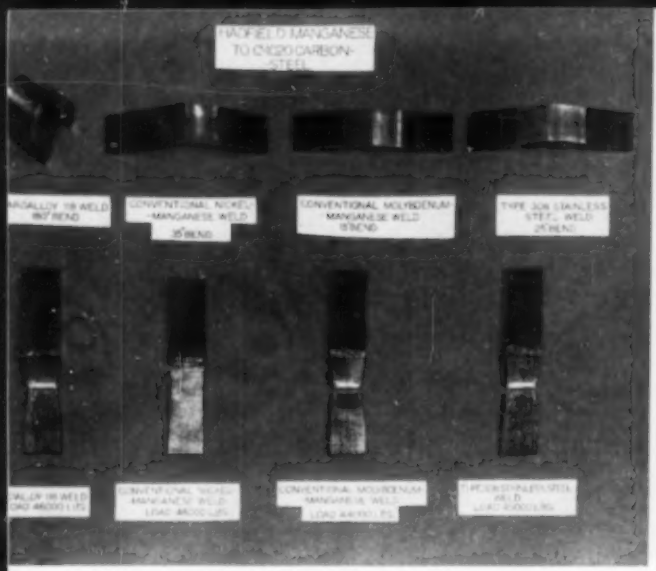

HADFIELD MANGANESE TO C1020 CARBON-STEEL
HARDALLOY 118 WELD 180° BEND
CONVENTIONAL NICKEL-MANGANESE WELD 35° BEND
CONVENTIONAL MOLYBDENUM-MANGANESE WELD 15° BEND
TYPE 308 STAINLESS STEEL WELD 25° BEND

Figure 6. Hardalloy 118 weld metal here was successfully joined C-1020 carbon steel to Hadfield manganese plate.

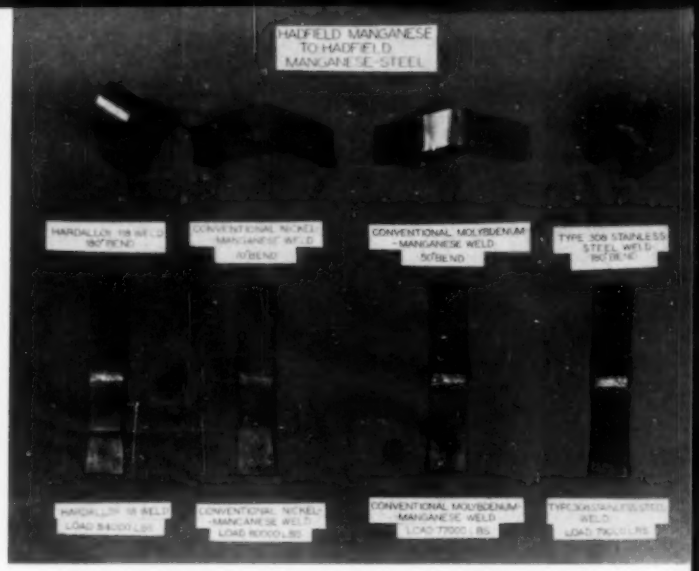

HADFIELD MANGANESE TO HADFIELD MANGANESE-STEEL
HARDALLOY 118 WELD 180° BEND
CONVENTIONAL NICKEL-MANGANESE WELD 90° BEND
CONVENTIONAL MOLYBDENUM-MANGANESE WELD 50° BEND
TYPE 308 STAINLESS STEEL WELD 180° BEND

Figure 7. Hardalloy 118 has been successfully used to join Hadfield manganese to Hadfield manganese plate.

juncture of the two dissimilar metals was a constant problem in the absence of the intermediate layer of stainless steel. All the welded assemblies tested in this series were made without the use of the intermediate layer.

Specimens joined with the improved nickel-manganese electrodes were bent 180° without developing any visible defects in the elongated surface of the weld metal or at the interface of the dissimilar metals. All other specimens of this series cracked after only minor bending, as shown in Fig. 6.

Tensile assemblies joined with the improved nickel-manganese electrodes or with Type 308 stainless steel electrodes broke in the carbon steel plate material without developing any defects in the weld area. Assemblies joined with conventional molybdenum-manganese electrodes also broke in the carbon-steel plate material. In this latter case, however, definite separations developed at the carbon-steel to weld-metal interface. Assemblies, joined with conventional nickel-manganese electrodes, repeatedly broke at the carbon-steel to weld-metal interface.

Problems encountered in the joining and surfacing of austenitic steel using austenitic manganese electrodes generally are not considered as severe as those associated with dissimilar metal assemblies. Austenitic manganese wear sections often are surfaced using austenitic manganese electrodes. At the same time, however, many operators felt that critical strength welds between two or more sections of manganese plate should be made only with stainless steel electrodes.

Results of this series to guided-bend and tensile tests are summarized in Fig. 7. Assemblies joined with Hardalloy 118 and Type 308 stainless steel electrodes were bent 180° without developing any visible cracks. Welds made using conventional manganese electrodes cracked after less than 90° of bending. Ductility of these latter manganese-steel to manganese-steel assemblies was somewhat better than that of manganese steel to carbon steel assemblies made using similar electrodes.

Plate Breaks

Hardalloy 118 tensile specimens were the only specimens breaking in the plate material. All other specimens in this series of tests broke either in the weld metal or at the interface between weld metal and plate material.

It can be seen from the foregoing analysis and somewhat technical evaluation that there is a definite need for hard surfacing electrodes of the low hydrogen type represented by the Hardalloy 118.

A list of the possible applications in earthmoving, quarrying and mining would be almost endless. It could almost, without hesitation, be said that wherever the steel parts of a piece of equipment, be they teeth, tracks or hammers, are subject to severe impact and wear, there is a hard surfacing electrode that can greatly increase the service life of the part.

If you are experiencing excessive wear on the end gates of your trucks, or your cement chutes are subject to heavy-duty wear, or your dredge bucket lips and furrowing shovels are wearing down too fast, it will more than pay you to investigate the advantages of on the job overlaying with hard surfacing electrodes. Full details on electrodes, procedures and techniques are available from various manufacturers of the hard surfacing type arc welding electrodes.

CHRISTMAS SEALS AT WORK!

A most important medical discovery during the past year was a blood test for the detection of tuberculosis.

Made possible by your purchase of Christmas Seals—under a grant from the National Tuberculosis Association—it is now undergoing widespread trials.

Continue the fight against TB—send in your contribution today.

Buy and use Christmas Seals

This space contributed to the National Tuberculosis Association and its affiliates by

EXCAVATING ENGINEER

West Indies Provide Backdrop for Tractor Show

Giant airlift brings 5,000 J. I. Case Co. dealers to Nassau in Bahama Islands.

Cole H. Morrow (left), J. I. Case special projects administrator, discusses with assistant Frank Wilson the intricate travel arrangements for "Operation Jig-saw."

AN armada of four-engine aircraft—DC-7's, Jetstream Constellations and DC6-B's is being used by J. I. Case Co., Racine, Wis., to transport its 5,000 dealers from all over the globe to a spectacular premiere of the firm's construction and farm equipment lines at Nassau in the Bahama Islands.

Complex technical arrangements were required for this unprecedented international airlift which will involve some 15 million air passenger miles. Four major commercial airlines are taking part—Delta, National, Northwest and United Airlines.

The first series of charter flights began in November and will continue during December and January. Planes are scheduled to move nearly 1,000 people in and out of Nassau every five days from 42 departure points from coast to coast in the United States.

Planning for the entire project was under the direction of Cole H. Morrow, special projects administrator for Case. He said, "We call the whole project 'Operation Jigsaw' because of the enormous complexities in fitting together the patterns of these flights with regard to equipment availability, passenger loads, and the size and shapes of our branch territories."

Two-Month Study

Morrow made a two-month study of the problem before beginning to piece together the travel plan. He said that in some instances the airlines themselves were so intrigued with the program's fine points that they requested copies of the study for the guidance of their own personnel.

When completed, the plan for the airlift turned up some unusual facts, Morrow said. "For instance, from an air miles standpoint, Montreal, Quebec, is as close to Nassau as Milwaukee, Wis. or Dallas, Tex.

"Although New York and Chicago are the nation's two busiest air terminals, because of our departure requirements, we will have no flights out of New York, and only one out of Chicago.

"Our longest flight will be 2,942 miles to Nassau from Portland, Ore. This plane and certain others will have to make stops enroute for crew changes, but 90% of the charters are non-stop."

On New Providence Island in the Bahamas, a LST craft lands dozers and materials to clear and construct site for Case show.

Canadian Excavator Plant Holds Open House

REPRESENTATIVES of Canadian construction, mining and industrial firms were among 500 guests present at an open house and dedication ceremony for Canada's newest excavator plant. Bucyrus-Erie Co. of Canada, Ltd., staged the events, including an equipment demonstration and plant tour, Oct. 31–Nov. 1.

Provincial and federal government officials, construction machinery dealers and Canadian press members also were part of the group.

The Canadian firm's $4 million Guelph manufacturing plant is now in full operation. It has about 100,000 square feet of floor space. Initial production at the plant began last year with only one model—a ¾-yd. machine—coming off the factory lines. Present output includes a ⅜-yd. truck-mounted excavator and 1-yd. crawler and truck-mounted models. Scheduled to be built soon is a 1½-yd. excavator.

Demonstrate Models

These four basic models formed the nucleus of the equipment show. Also demonstrated was the all-hydraulic Hydrocrane truck crane-excavator.

William L. Litle, chairman of the board of the Canadian company, told guests the concern expects to quadruple the size of the Guelph facilities within 10 years. "Canada's growth potential," Litle said, "is so fantastic that no economist or business observer can exaggerate the prospects."

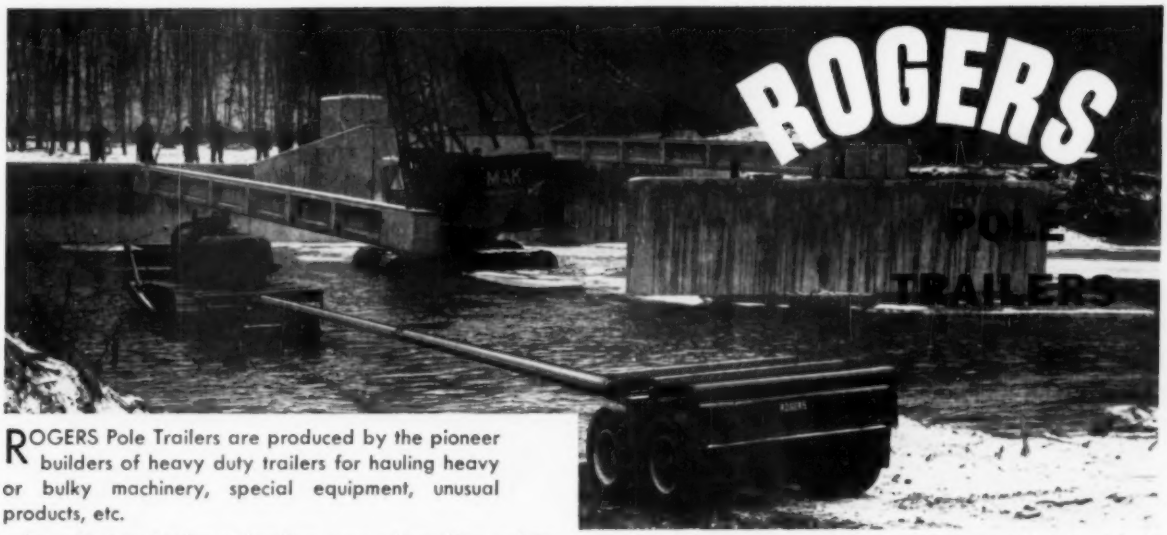
Litle pointed out that the Guelph plant is "an integrated operation," not simply an assembly factory. "This is not a warehousing operation," he said, "but a real manufacturing plant."

Guided tours for the visitors through the manufacturing facilities emphasized the "Made in Canada" theme. Attention was focused on machine tool equipment, welding and fabricating processes and production line assembly methods.

Robert G. Allen, president of Bucyrus-Erie Co. of Canada, told guests at a reception following the open house events that the new plant had a completely Canadian background. He said

Here are Bucyrus-Erie Co. of Canada officials R. G. Allen (left), president, and W. L. Litle, chairman; Guelph industrial commissioners C. B. Cutten and J. D. Oaks; Guelph Plant Manager R. E. Story; and Sales Promotion Manager C. F. Parthum.

Bucyrus-Erie Co. of Canada's $4 million Guelph (Ont.) plant is now producing three basic excavator models. It is near Toronto.



ROGERS Pole Trailers are produced by the pioneer builders of heavy duty trailers for hauling heavy or bulky machinery, special equipment, unusual products, etc.

They feature facility of loading, ease of handling, safety of control and ruggedness.

In addition to rugged construction throughout including the use of large brakes and heavy duty roller bearings, versatility is a feature of these Roger Pole Trailers.

They have been in use for decades hauling long, unwieldy products including steel beams, iron bars, smoke stacks, special equipment, coast defense guns, etc.

With the development of prestressed concrete beams Rogers Pole Trailers were proven to meet the unusual requirements of this type of hauling.

Experience Builds 'em ROGERS HEAVY DUTY Towmaster Trailers Performance Sells 'em

The drawbars or reaches may be extended to haul long objects and then telescoped to permit fast return trips with a shortened overall length.

To the front section is welded a bar containing holes at intervals into which a pin in the locking cap is inserted.

This permits lengthening or shortening the drawbar in increments of two feet. Or, if found desirable, the reach can be removed entirely and rigid, self supporting objects lashed to the front bolster and its after end secured to the trailer bogie.

Note the various features then write for prices and any additional information desired.

If you have a new hauling requirement send the facts and we will submit recommendations without charge or obligation.

ROGERS HEAVY DUTY TRAILERS

ROGERS BROS. CORP. ALBION, PENNA.

Export Office: 50 CHURCH ST., NEW YORK 7, N.Y. U.S.A. *Cable Address:* Brosites

that the plant was designed and built by local firms and that with only one exception all its employees were Canadians.

Architects were Prack & Prack, Hamilton, Ont., and prime contractor was Pigott Construction Co., also of Hamilton.

The facilities are located on a 27½-acre site along highway 7, west of Guelph and opposite General Electric's Canadian plant. They are part of the city's 110-acre "industrial basin" development. This tract of land was acquired by the city council a few years ago to attract new industries to the community.

Guided tour of excavator production facilities for open house visitors emphasizes "Made in Canada" theme.

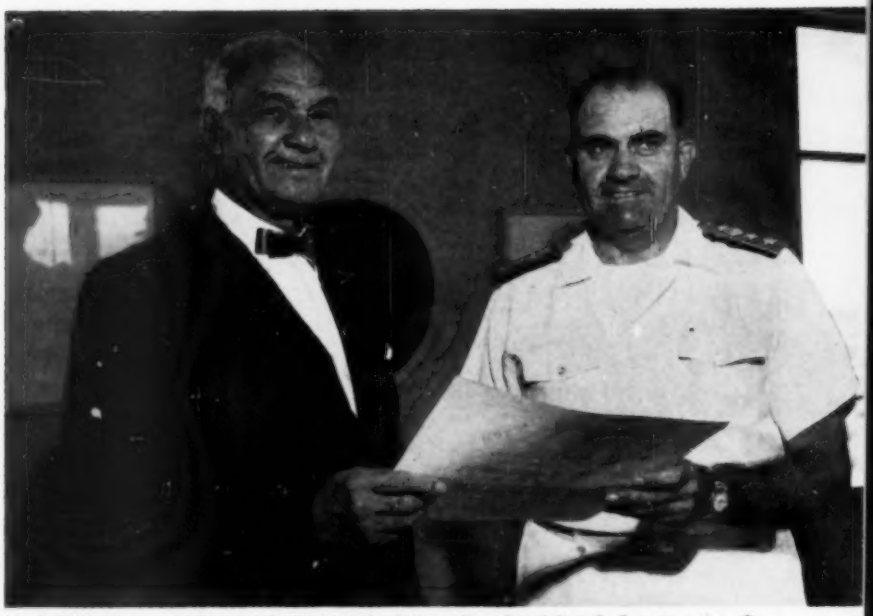
News from the Field

Navy Commends Hawaii Contractor

Hawaiian Dredging & Construction Co., Ltd., oldest and largest general contracting firm in the Pacific Ocean area, has received a United States Navy Bureau of Yards & Docks commendation for its performance in rehabilitation and expansion of naval facilities on the island of Midway. Rear Admiral E. J. Peltier, chief of the Bureau of Yards & Docks, made the presentation in Honolulu. W. F. Dillingham, chairman of the board and founder of the island building and dredging concern, accepted the commendation certificate.

The Bureau of Yards & Docks commendation, supplanting the war-time Navy "E", is seldom awarded in time of peace. Hawaiian Dredging is the second recipient to be honored by the award since the end of World War II.

The expansion of naval aviation facilities on the island of Midway involved a vast complex of construction projects totaling nearly $40 million. It included channel and harbor deepening and widening, miles of sea wall, new piers and wharves; rebuilding and extending existing runways and construction of one of the world's largest aircraft hangars, together with taxiways, parking aprons and repair facilities; fuel and water storage facilities; roads, streets and various types of buildings. At the peak of construction the company had approximately 1,200 men at work on the island.

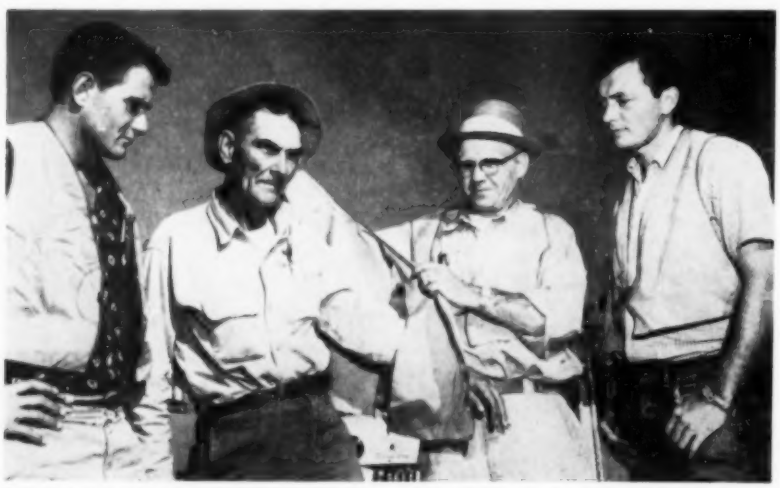


W. F. Dillingham, chairman of the board of Hawaiian Dredging & Construction Co., Ltd., accepts a Navy commendation certificate from Rear Admiral E. J. Peltier, USN.

Originally a $15 million contract, the work was completed in two years. Additional items requested by the Navy ran the contract value to almost $40 million, but original completion dates were met as scheduled.

General manager of the Midway operation was A. A. Carswell, vice president of Hawaiian Dredging & Construction Co. A. C. Croze, assistant vice president, was project manager and Dave Foster was general superintendent.

Civil Engineering Corps personnel of the Navy concerned with the project included Capt. F. C. Ray, CEC USN, public works officer, 14th Naval District and officer in charge of the Midway contract; Capt. W. E. Davidson, CEC USN, deputy public works officer; and Capt. John Dominy, CEC USN, resident officer in charge of construction, operating from Honolulu.



Brilliant red safety jackets prescribed for Utah state road commission crews are donned by Cliff Meyer (left), Ray Johnson, C. E. Marcum and Jack Paganelli. All crews exposed to the hazards of approaching traffic will wear the new jackets.

Utah Safety Program

A move to lessen accidents at state road construction sites and thus reduce construction costs is now underway by the Utah state road commission, according to Elmo R. Morgan, new director of highways. The program was accelerated with the appointment of a safety coordinator by Ellis L. Armstrong, now Commissioner of the Bureau of Public Roads, as one of his last official acts while director of highways for Utah. The new coordinator, a veteran of safety work in the state, is Keith M. Macfarlane.

One of the first moves of the new safety coordinator was to prepare an accident prevention clause which was inserted into construction contracts let in the state in November and which will be placed in all future contracts. State

officials believe that this will place Utah among the first states to add such a provision to contract specifications.

Safety Coordinator Macfarlane has commenced a series of meetings throughout Utah with district and resident engineers. At the meetings, details of the safety program are being discussed and the engineers briefed on the new safety provisions for construction contracts.

In the special provisions being added to construction agreements, it is intended that the *Manual of Accident Prevention*, published by the Associated General Contractors, will be closely followed. Details of the manual are being reviewed with all state engineers. In addition, state road authorities will work closely with officers of the Associated General Contractors of Utah in carrying out the new provisions.

The new program for Utah has been worked out through the cooperation of a safety committee comprising the director of highways, staff engineers of the road department and the state industrial commission.

Name Allen B-E President

Robert G. Allen was elected president in charge of all operations of Bucyrus-Erie Co., South Milwaukee, Wis., by the board of directors at a meeting in New York City on November 25. Allen's election becomes effective December 16.

Robert G. Allen

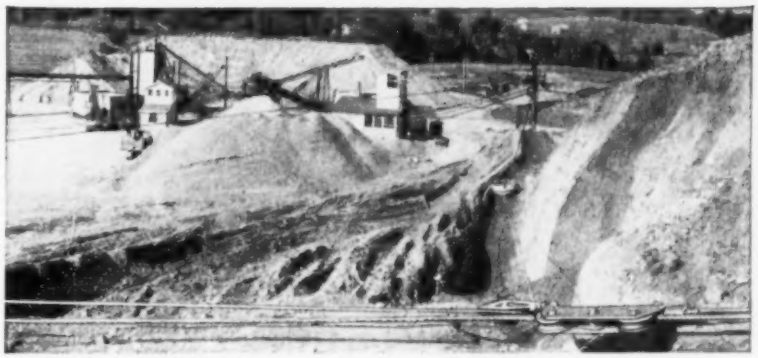
He succeeds William L. Litle, who will continue as chairman of the board and senior officer.

Allen joined Bucyrus-Erie in May 1957 as vice president and was subse-

Continued on page 52

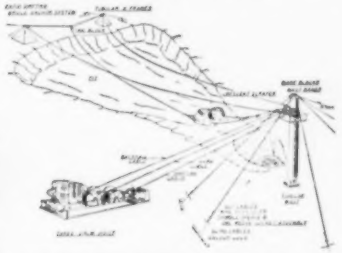
Profitable Sand and Gravel Handling Starts with a Sauerman DragScraper

digging *and hauling to plant*



This digging and hauling operation is being handled with a 3-yd. DragScraper.

This 2-yd. DragScraper is dumping river gravel dug from 50 ft. of water into grizzly feeding conveyor to plant. *See Sauerman News No. 147.*



● **THE SAUERMAN METHOD**— *showing a basic DragScraper installation. Variations of this method are Sauerman engineered to handle the toughest digging jobs at the lowest cost per cu. yd.*

A Sauerman DragScraper handles the two basic steps of material flow—digging and hauling—in one continuous operation. No double handling is required. You cut labor costs in half—or even more—because a single machine, controlled by one man, replaces the multiple equipment required by other methods.

Profitable handling is further assured by a maintenance cost of only 1½ cents per cu. yd. for the average size Sauerman installation. On larger machines, the increased volume drops this cost still lower. You'll save money on power, too, by eliminating heavy machinery with limited handling-to-dead weight capacity. You pay only the cost of moving the actual digging tool—a Crescent DragScraper.

The best Sauerman Machine for your plant is governed by the nature of the deposit, location of material, depth and plant layout. DragScraper machines in sizes from ⅓ to 15 yds. provide delivery at the lowest cost per cu. yd.

Why not consult Sauerman engineers about your plant? Their recommendations will be based on almost fifty years of materials handling and excavating machinery experience. Ask for Catalog A (DragScrapers).

SAUERMAN BROS., INC.
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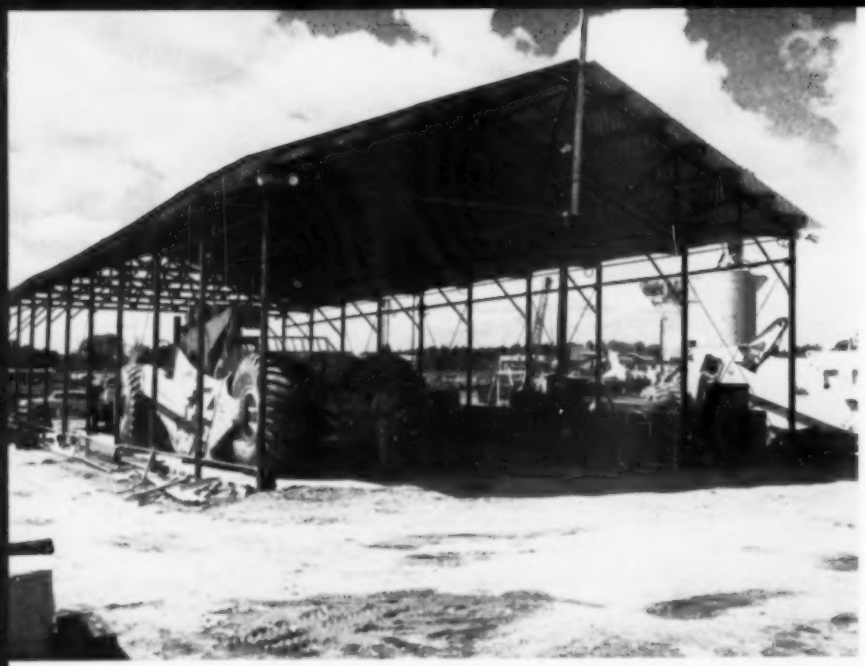
Crescent Scrapers • Slackline and Tautline Cableways • Durolite Blocks



A "hip pocket" garage is provided by this easily dismantled steel structure on the Ohio Freeway job of Harrison Construction Co., Pittsburgh, Pa. Ed Buford, master mechanic, checks a scraper at the 40 x 90-ft. open-air building which has an aluminum roof supported on tubular steel sections. The job is located near Conneaut, Ohio.

News . . .

Continued from page 51

quently made executive vice-president in November of that year. Litle was elected vice president in 1943, president in 1952 and has served as chairman and chief executive officer from 1957.

The board simultaneously announced the election of Victor C. Studley as vice president in charge of finance, succeeding Frederick C. Weiblen who is retiring on December 15, and the election of John R. Warner as vice president in charge of purchasing. Studley also continues in his present post of treasurer. These elections are also effective December 16.

Name Deputy Engineer at Philadelphia

Lt. Col. Frank A. Gerig has been named to fill the newly created post of deputy district engineer of the Army Engineers' Philadelphia District, according to Col. William F. Powers, district engineer.

The new post will enable Col. Gerig, formerly executive officer, to assume additional responsibilities for the accomplishment of the $200 million work program which the Engineers have under way in the Delaware Valley. This includes deepening the channel in the upper Delaware River and maintenance dredging on the lower Delaware; a comprehensive survey of the Delaware watershed; construction of three flood control dams; and construction of a new high-level bridge across the Chesapeake and Delaware Canal at Summit, Del. The district also has a major military construction program that includes projects at Dover Air Force Base, McGuire Air Force Base, Fort Dix and on Nike sites protecting the area.

High-Speed Batch Plant

A one-stop twin batching plant is efficiently batching concrete to rigid Corps of Engineers specifications at a Texas airfield paving project. T. L. James & Co., Inc., and W. R. Aldrich & Co. are contractors at Amarillo Air Force Base, Amarillo, Tex.

On this 593,000-cu. yd. paving project, schedules require simultaneous operation of two paving spreads—each spread with three dual-drum pavers. To avoid expense and time loss of separate stops for charging cement and aggregates, a high capacity one-stop Noble automatic batching plant was erected.

A double driveway arrangement permits two batch trucks to be loaded at the same time. The plant weighs and delivers 14 batches into two 7-compartment batch trucks in less than two minutes. Each 1.4-cu. yd. batch contains five materials—sand, ¾-in. rock, 1½-in. rock, portland cement and natural cement.

An automatically controlled batcher dump cycle pre-blends the cement and aggregates and eliminates any requirement for separate cement compartments in batch trucks. Two men operate this twin one-stop plant compared to four or more men for operating a pair of conventional two-stop or three-stop plants.

The plant has overhead storage for

Continued on page 54

An air base project in Texas uses this one-stop twin batching plant to automatically weigh 1.4-yd. batches of concrete mix. Plant delivers 14 batches in two minutes.

This 40-R is drilling 9-in. blast holes on an 18 x 18 ft. pattern at a large western copper mine. The material drilled is copper ore and rock overburden, consisting largely of hard-to-drill silicified and cherty material. Yet the 40-R is doing an outstanding job at this location.

A seemingly unsolvable drilling problem was resolved when this 40-R was added to the production team of a large Montana mining company. The problem: to speed up drilling operations enough to stay ahead of the 150-B shovel. The 40-R did it easily. It drills 9-in. holes through leached granite rock and a pyrite formation containing copper.

Why Do Mine Owners Prefer Bucyrus-Erie Rotaries?

The answer is summed up in one word — output! Ever since the first Bucyrus-Erie rotary was placed in operation in 1953, these machines have broken old footage records and retired scores of other drills from open pit mines everywhere. Two features are mainly responsible for this performance — variable drilling speed and variable pulldown pressure.

VARIABLE DRILLING SPEED is achieved through Ward Leonard variable voltage control. This control gives the operator smooth, instant command over rotation of the drill pipe. It lets him choose the most efficient speed for a given formation without stopping the drilling operation.

VARIABLE PULLDOWN PRESSURE on the bit is supplied hydraulically. It provides controlled load on drilling tools for maximum penetration, regardless of material.

The result is speedy, economical drilling of large-diameter holes. And with Bucyrus-Erie drills you get an extra bonus — parts and service second to none.

Bucyrus-Erie rotaries are available in two models — the 40-R with electric or diesel-electric power for drilling 6¾ to 9-in. holes, and the 50-R with full electric power for drilling 9⅞ to 12¼-in. holes.

Find out how the exclusive features of Bucyrus-Erie rotaries contribute to increased economy . . . can cut your drilling costs. Write direct: **Bucyrus-Erie Company, Drill Division, Box 324, U.S. Highway 40 West, Richmond, Indiana.**

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OWEN

Engineering scores again

Never before have so many important and improved features been combined in a material handling bucket as in the new OWEN Center Line Reeving clamshell buckets . . . redesigned from bowl to head.

OUTSTANDING IS THE 75% TO 100% INCREASE IN CABLE LIFE.

Here's how it's done. The closing line now leads straight through the center plane of the head of the bucket to first lower sheave, thus eliminating bending of the closing line around upper guide sheaves as in conventional block and tackle and lever arm buckets.

A complete line in three models . . . "KCL" Standard Material Handling Bucket . . . "SCL" Wide Barge Type Bucket . . . "CCL" Light Material Bucket. Available in sizes from 1/4 to 10 cubic yards.

Write today for additional information.

The OWEN BUCKET Co.

BREAKWATER AVENUE, CLEVELAND 2, OHIO

BRANCHES: New York • Philadelphia • Chicago
Berkeley, Calif. • Fort Lauderdale, Fla.

News . . .

Continued from page 52

500 barrels of portland cement and 500 barrels of natural cement. Ground silos provide additional storage for 3,000 barrels of portland cement and 1,100 barrels of natural cement. Two 550 barrel-per-hour elevators permit handling of both types of cement simultaneously, or through a system of selector gates. Either type of cement can be handled by both elevators at the same time. The plant stores 300 tons of aggregate.

On completion of this project, the Noble plant will be divided into two separate and complete plants for future work.

Management Expert Heads Contracting Firm

James H. Marks has been elected chairman of the board of directors and chief executive officer of Louis Garavaglia Contractors Inc., 24240 Mound Rd., Warren, Mich. Marks, a management consultant, has been active in the affairs of the company since last July when he stepped in to help solve the many problems that resulted from the deaths of the two brothers who were the company's top officers.

Louis A. Garavaglia, Jr., the firm's president and treasurer, and Jule C., vice-president and secretary, were killed March 24 when their helicopter crashed while on a job inspection trip near Detroit, Mich.

At the time of their deaths, the company had 25 construction jobs under way. Most of the work was in the Detroit area but Garavaglia crews were also working on the Illinois toll highway in Chicago and at the Mackinac Bridge.

The firm was founded by Louis A. Garavaglia, father of the brothers, in 1918.

Since the brothers' deaths, their two sisters, who formerly had minor roles in the company's affairs, have assumed greater responsibilities. They are Mrs. Louis P. (Annette) Fontana, president and treasurer, and Mrs. Joseph J. (Louise) Churches, vice president and secretary.

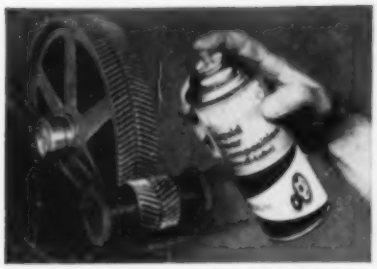
Marks worked for the Packard Motor Car Co. for 30 years and had a national reputation as an automotive executive when he retired as the company's executive vice president in 1946.

Last year the Garavaglia firm grossed slightly more than $26 million. This year the gross will be well over $30 million, according to a spokesman for the company.

"THAT TAKES CARE OF THAT EXCAVATION."
"YOU KNOW VERY WELL WHAT SPAN YOU WERE TO MEET US IN THE MIDDLE WITH!"
Ex-Laffs
by Roesler
PILE DRIVER
"THE BOYS ON THE JOB JUST CAN'T DO ENOUGH FOR ME!"
WITH HIM AROUND, - WE WON'T NEED A SHEEPSFOOT TAMPER."
"NO THANKS, - I'M DRIVING."
"THAT'S UPSWILL FOR YOU! - LOAN HIM 5 BUCKS AND HE AVOIDS YOU LIKE A PLAGUE."
EXCAVATING ENGINEER
"I DON'T SEE HOW YOU CAN POSSIBLY MISS, NOW!"

TRIAL SAMPLES

Of World-Famous WHITMORE'S Lubricants NOW IN AEROSOL SPRAY-ON CANS!



HANDI-LUBE LIQUID GEAR COMPOSITION

For open gears, sliding surfaces—exclusive formulas eliminate metal to metal contact, keep wear on the lubricant not the metal—no breakdown even after prolonged use under water—available for every climatic condition—packaged in handy 16-oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

WIRE ROPE SPRAY LUBRICANT

Exclusive formulas for lubricating and protecting wire rope, chain, springs. Penetrates to the core of wire rope minimizing internal friction and increasing usable life up to 300%—special protective qualities absolutely eliminate corrosion—non-gumming qualities reduce "carry-back"—packaged in handy 16 oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

65 YEARS OF LEADERSHIP LUBRICATING THE FOLLOWING:

• Open Gears, Dipper Sticks, Cams • Enclosed Gear Cases • Wire Rope and Cable
• Hydraulic Units, Torque Converters • Roller, Ball, and Sleeve Bearings • Speed Reducers

Est. 1893

THE WHITMORE MANUFACTURING CO.

LUBRICATING ENGINEERS

CLEVELAND 4, OHIO, U.S.A. PHONE: VULCAN 3-7272

Equipment You Ought to Know About

Motor Oil

Manufacturer: Standard Oil Co. (Ohio), Department EE, Cleveland, Ohio.

Claims: A new heavy-duty motor oil designed to meet the exacting needs of contractors and other operators of gasoline and diesel powered heavy equipment has been developed by Standard Oil (Ohio).

This new Sohio HD S-1 motor oil exceeds the requirements set up for more-severe-than-usual gasoline and diesel engine applications. The new motor oil withstands the rigors of extreme operating conditions encountered by engines due to extremes of atmospheric temperatures and or high sustained engine temperature, high load operation, intermittent or low-duty operation and engine design considerations.

It is recommended for heavy-duty over-the-road trucks and busses with gasoline or diesel engines; all light trucks other than those engaged in extremely low-duty city delivery; diesel and gasoline engines in construction equipment; stationary diesel and gasoline engines; hydraulic systems on construction equipment; and for reciprocating type air compressors.

Drill Steels

Manufacturer: Atlas Copco Eastern, Department EE, Paramus, N. J.; Atlas Copco Pacific, Department EE, San Carlos, Calif.

Claims: Atlas Copco has introduced to the American market easily-coupled and fatigue-resistant 1½ and 2-in. cold rolled alloy extension drill steel. The new round extension steels feature uniform strength and true circular flushing holes. These characteristics are achieved by cold-rolling the steel from billets, avoiding the molecular disturbance and resultant weakness caused by hot rolling.

Made from prime Swedish metal, the new Sandvik Coromant extension steels are rope-threaded—two threads to the inch—to assure extreme ease in both coupling and uncoupling.

The extension steels may easily be re-

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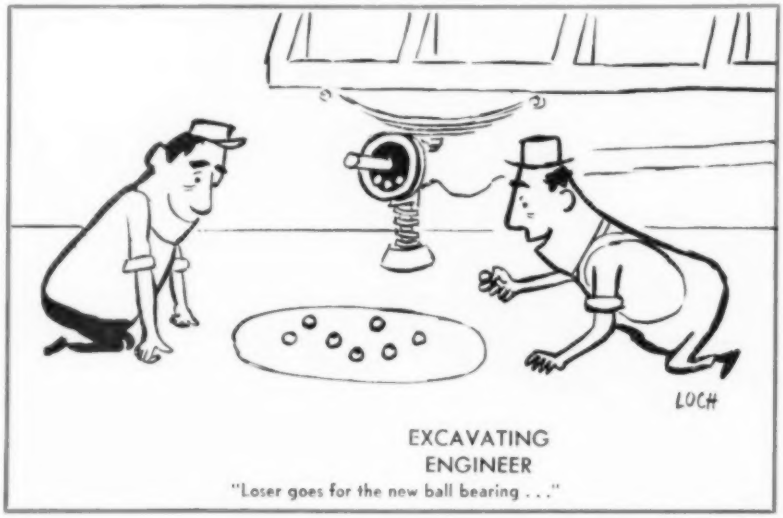
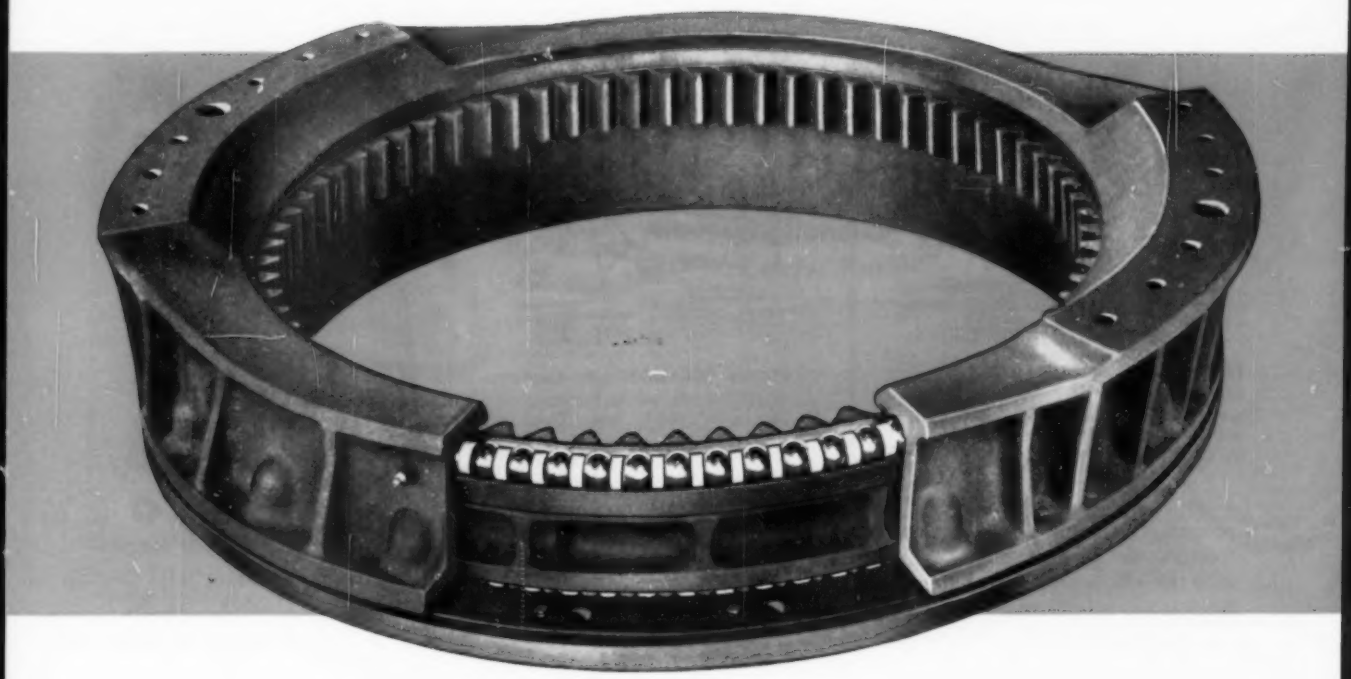


EXCAVATING ENGINEER

"Loser goes for the new ball bearing . . ."

New 11-B SWING CIRCLE *

helps cut costs to boost your Profits



Low friction, high loading capacity, low maintenance, and minimum play are cost-cutting advantages you get with the new ball bearing swing circle introduced on the new Bucyrus-Erie 11-B Transit Machine. This swing unit is a bench assembly. It is welded directly to the carrier and bolted on the underside of the revolving frame. Like other new bench assemblies in the simple, compact 11-B machine, it contributes to ease of maintenance and accessibility.

The new swing circle consists of upper and lower circles, clamp ring, and a double row of ball bearings. This arrangement helps distribute the loads between upper and lower works, eliminating the need for a center pintle or centering gudgeon. What's more, the unit is prelubricated and sealed at both top and bottom.

The swing circle is just one of many features that contribute to the outstanding performance of the 11-B. Ask for the complete story on this new money maker. See your nearby Bucyrus-Erie distributor *now!*

459E58C

* One of the important new 11-B features that can help make money for you.

BUCYRUS ERIE

A Familiar Sign at Scenes of Progress

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

ELLICOTT DRAGONS*

insure low-cost operation, in moving waterbound solids.

Ellicott "DRAGON" 10—Easily assembled, pumps mud, silt, sand and gravel through pipelines up to 2500 feet long; capacity 90-325 cubic yards per hour.

Ellicott "DRAGON" 8—Capacity 60-150 cu. yds. per hr. through pipeline up to 2000 ft. long. "Dragons" available with enclosed or tropical deck house, as shown.

Ellicott "Dragon" model dredges recognized the world over for efficiency, economy, versatility and portability . . . offer engineers, builders, contractors, the cheapest method of moving waterbound solids. And do it with the efficiency and economy possible only with a hydraulic dredge. Ellicott can supply you with a full line of spare parts and auxiliary equipment, plus expert engineering service. Write for free Bulletin No. 925.

*T. M. REG. U. S. PAT OFF. MARQUE DÉPOSÉE

ELLICOTT MACHINE CORPORATION

1619 Bush Street, Baltimore 30, Maryland, U. S. A.

Subsidiaries: Dragues Ellicott France, Paris, France; Ellicott de Mexico, Mexico City, Mex.; Ellicott Fabricators, Inc., Baltimore, Md.; McConway & Torley Corp., Pittsburgh, Pa.; Baltimore Foundry & Machine Corp., Baltimore, Md.

Successors to the floating dredge business of the Bucyrus-Erie Co. and the American Steel Dredge Co. Complete engineering sales and repair parts service. 1144

New Equipment . . .

Continued from page 56

threaded on ordinary metal lathes without heat treatment. Thread ends are carburized for lasting durability.

The 1½-in. rods are available from stock in 6, 8, 10 and 12-ft. lengths and the 2-in. rods are stocked in both 10 and 20-ft. sizes. Other lengths are available on special order.

Designed for use with large rock drills, rod shank adapters are available for all standard equipment. The 1½-in. rods are used in drills with 4½-in. pistons; the 2-in. extension steel is used in drills with 5-in. diameter pistons.

Rope-threaded Sandvik Coromant detachable bits featuring tungsten carbide inserts are available to match the new cold rolled extension steel.

Detachable bits for the 1½-in. cold rolled steel are available in 2½, 2¾, 3 and 3½-in. diameter sizes. Bits for the 2-in. extension steels are made in 3½, 4, 4½ and 5-in. sizes.

Flushing hole diameter is ⅝-in. for the smaller rod and ⅞-in. in the 2-in. rod. Coupling sleeves measure $2\frac{5}{32}$ inches in diameter and 7 inches long for the 1½-in. steel and $3\frac{1}{32}$ inches and 7⅞ inches long for the 2-in. steel.

Submersible Pumps

Manufacturer: Stenberg Mfg. Corp., Department EE, Hoosick Falls, N. Y.

Claims: Flygt portable pumps for contractors are now being assembled for the first time in the United States by Stenberg. The Swedish design pumps are fully submersible and are operated by a built-in electric motor. They will drain water down to the last inch in depth, and will not suffer damage if allowed to run dry. Pumping starts again instantly when water flows into the sump.

An outstanding feature of Flygt pumps is their ability to handle a very high proportion of solids, and to run for long periods without attention. They are very easily moved around and require no suction hose or installation.

The largest model is the 67-hp B-150 200L, which weighs 1,250 pounds and has a capacity of 1,500 gpm at a head of 65 feet. The intermediate size B-80L (weight 183 pounds) has a capacity of 50 gpm at 150 feet or 300 gpm at 25 feet. The smallest of the series is the B-38L, which weighs only 79 pounds and can be conveniently carried by one man. It has a capacity of 10 gpm against a head of 65 feet or 45 gpm at 20 feet. Higher heads can be obtained by running the pumps in tandem.

The pumps are sold and serviced from coast to coast.

105-hp Tractor

Manufacturer: International Harvester Co., Construction Equipment Div., Department EE, 180 N. Michigan Ave., Chicago 1, Ill.

Claims: A new IH diesel crawler tractor designated the model TD-15, has just been announced. The 105 horsepower developed by its six-cylinder engine gives the TD-15 more power than any other medium-size crawler tractor, according to International.

The tractor's engine is noted for its outstanding smoothness. It has all-weather, push-button, gasoline-conversion starting. Features of the engine include positive valve rotators, pressure-lubricated rocker arm shaft, aluminum alloy pistons, fully counter-balanced crankshaft and twin plunger IH injection system.

Another first in the 100-hp tractor class is the new six-speed, single stick, full reverse transmission, designed for practical application of all six speed ranges. A shuttle bar control permits instant reverse or forward motion without shifting. With a single lever, an operator can shift the transmission through any of six speed ranges. The convenient shift pattern easily permits full use of reverse speeds that are approximately 25% faster than corresponding forward gears.

The TD-15 is the second new diesel crawler tractor introduced by International Harvester this year. Previously, the 134-hp TD-20 was announced. Both tractors have a full line of matching attachments available.

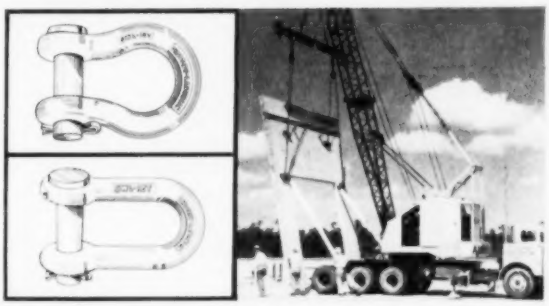
Seven other models in the line range from the 41.5-hp T-6 through the 200-hp TD-24 torque converter diesel.

Significant changes also have been made in the International Drott "4-in-1" and Skid-Shovel to match the new TD-15. Features include a 2¼-yd. bucket of improved design to handle sticky material; heavier shovel frame and 20% stronger lift arms; increased reach of 36 inches and lifting height of 12 feet; and strengthened lift arms at skid-shoe area to handle greater pry-action breakout force.

The 42-line track frame and three-grouser track shoes are provided for Skid-Shovel equipment combinations.

An innovation to the Drott loader line is an automatic "kick-out," an adjustable cable control feature which can be set to stop lift arm movement at any desired height.

Load-Rated* DOES THE JOB!



Handling Tilt-Up Panels With Crosby-Laughlin Load-Rated Shackles

Crosby-Laughlin* LOAD RATED Shackles are demanded on jobs where safety is essential! "Takes the guesswork out of buying fittings" say users of the LOAD-RATED Line. Quality steel is drop forged—heat treated for toughness. *Order capacity* for the job—*see* guaranteed capacity stamped on LOAD-RATED Fittings! Safety is no accident when you order from the *world's most complete line* of drop forged fittings for wire rope and chain. Sold by construction, industrial and mill supply distributors. Ask for free catalog.
*Trademark

CROSBY-LAUGHLIN *Division*
AMERICAN HOIST & DERRICK COMPANY
FT. WAYNE, INDIANA

Anti-Friction Lubricants

Manufacturer: Whitmore Mfg. Co., Department EE, Cleveland 4, Ohio.

Claims: Two new Whitmore anti-friction lubricating compositions have no melting or dropping point. The compositions give constant protection to roller, ball, sleeve bearings and sliding surfaces in "hot" bearing applications or in areas with high ambient heat.

Typical applications for the new lubricants are hot bearings on draglines and shovels, bearings or sliding surfaces on hot conveyor lines, hot and cold tunnel car bearings, high temperature

bearings on shaker screens and bearings on pelletizing equipment in the mining industry.

The compositions are moisture resistant and will not wash out. They have high chemical stability and a heavy molecular structure with exceptional metal adherence properties.

The anti-friction lubricants are available in two grades: No. 1 has light density and is recommended for high-speed temperature applications. No. 2, with its heavier density, is for low-speed high temperature applications or loosely fitted bearings.

The lubricants are available in 14½-oz. cartridges for application with lever-type cartridge guns and in regular bulk containers for use with automatic sys-

Continued on page 60

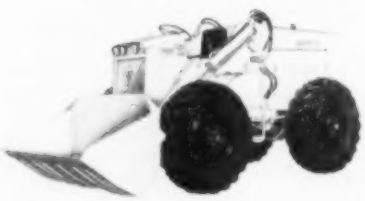
New Equipment . . .

Continued from page 59

tems, grease cups, pressure systems or grease guns.

A free trial sample 14½-oz. cartridge is available upon request. When requesting the sample, please specify anti-friction composition No. 1 or No. 2.

1¾-Yd. Loader



Manufacturer: Tractomotive Corp., Department EE, Deerfield, Ill.

Claims: A four-wheel drive 1¼-yd. front-end loader has been introduced by Tractomotive. The new 15,850-lb. loader, designated the TL-16 Tractoloader, has a maximum lifting capacity of 14,000 pounds and a breakout force of up to 18,400 pounds.

The TL-16 bucket tips back 40° at ground level. For maximum stability while traveling, the bucket can be tipped back to an angle of 45° when only 14 inches off the ground. Maximum dumping clearance under the hinge pin is 11 feet 6 inches. Under the bucket cutting edge the dumping clearance is 9 feet 1 inch. Reach from the front of the tires to the cutting edge at the maximum dumping height is 2 feet 8 inches. From the front of the frame the reach is 3 feet.

Power is provided by either a 101-hp 6-cylinder Hercules gasoline engine or a 97-hp 6-cylinder Hercules diesel engine. It has a 3.5 to 1 torque converter and a three-speed full power-shift transmission. All speeds, in both forward and reverse, are selected by a single lever. Top travel speed in either direction is 27 mph.

For safety and handling ease, the TL-16 has rear-wheel power steering, and four-wheel power brakes which can be operated by either the right or left foot. A separate, positive locking, mechanical parking brake is also provided.

Planetary axles are standard equipment. They are pin-connected to a one-piece welded frame for greater strength and rigidity, and are equipped with a high traction differential.

Other features include a six-way adjustable operator's seat, bucket level indicator, rear-axle disconnect and a fully enclosed hydraulic system which includes a full flow micronic filter as well as a screen and a magnetic filter. Ignition key type starting is provided on both gas and diesel models.

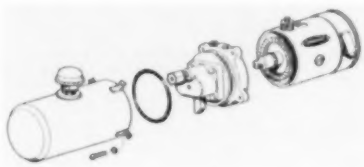
The TL-16, like the five other Tractoloader models, is sold and serviced by Allis-Chalmers construction machinery dealers.

Hydraulic Power Package

Manufacturer: Wooster Div., Borg-Warner Corp., Department EE, Wooster, Ohio.

Claims: A new line of low-cost, self-contained, versatile power packages producing hydraulic power from an electric source is now available from Wooster.

The new package incorporates an electric motor, hydraulic gear pump with integral relief valve, check valve and reservoir in one compact assembly. These components are shown in the exploded view below.



Pressure loaded bearings, a patented feature, automatically compensate for wear to assure high volumetric efficiency and longer life. Few moving parts insure longer trouble-free operation and less maintenance.

The new Wooster package is designed to handle a wide variety of work loads, even loads as great as those encountered in such heavy equipment as tailgate loaders, tractors and lift trucks. Capacity of the gear pump ranges from .36 to .80 gpm. Hydraulic control valves, furnished with integral relief and check valves, give perfect control of the load in lifting, lowering and holding positions, even in extreme cases of motor stall.

Reservoir capacities range from 0.43 to 1 gallon. The reservoir also serves as the pump housing. It is made of a single piece of deep drawn steel.

The Wooster line of motors, developed specifically for the new power

package, may be open-ventilated, totally enclosed or standard starter type motors. They are available for operation from a 6, 12 or 24-volt DC source. Shaft rotation is available for operation in either direction or can be reversible for greater versatility.

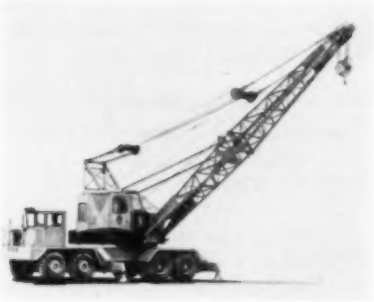
35-Ton Truck Crane

Manufacturer: Koehring Co., Department EE, Milwaukee 16, Wis.

Claims: Load lifts up to 35 tons with a 40-ft. boom can be made on or off the pavement with the new Koehring 435 truck crane. A top travel speed of 26.5 mph offers quick movement from job to job.

Capable of swinging a 120-ft. boom, the 435 can use boom jibs 15, 20, 25 or 30 feet long when extra reach is necessary. Safety boom limit stops and automatic power boom lowering are standard equipment.

A combination pin-pad connected boom permits boom length changes by



two men. Lugs on the pendant suspended boom allow folding for transportation, even when maximum boom is needed for the job.

Total weight of the truck crane is 89,800 pounds. Removal of the counterweight, pedestals, outriggers and boom lowers that weight to 62,500 pounds, well within load limits.

Powered by a 216-hp engine at 2,400 rpm, the truck has eight speeds forward —four in main and two in auxiliary transmission. Either gasoline or diesel power units can be furnished for the upper machinery. All four axles of the 435 are equipped with air brakes.

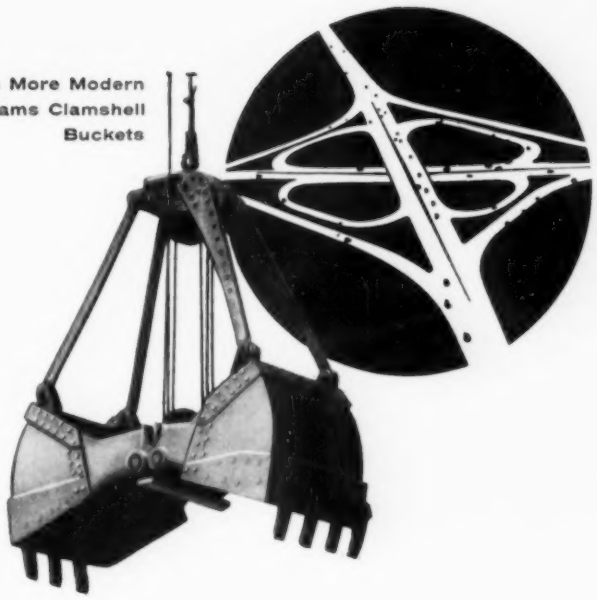
Concrete Truck Mixers

Manufacturer: Worthington Corp., Concrete Machinery Div., Department EE, Plainfield, N. J.

Claims: Two new Worthington lines of concrete truck mixers feature heavy-duty transmission designs.

The Fleetbuilder model line is driven through a heavy-duty sliding gear trans-

Continued on page 62



WILLIAMS BUCKETS

built to dig

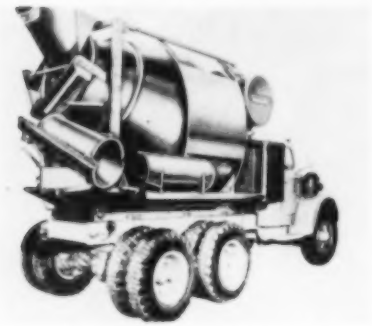
Williams Bucket Division, The Wellman Engineering Co., 7010 Central Ave., Cleveland 4, Ohio, U.S.A. Branches, New York, 420 Lexington Ave., Chicago, 520 N. Michigan Ave., Birmingham, 2600 Park Lane Ct. No.

New Equipment . . .

Continued from page 61

mission in conjunction with a master clutch to control forward and reverse rotation of the mixer drum.

Standard twin disc clutches are used in the Fleetmaster model for controlling forward and reverse rotation of the drum. The multiple discs in these clutches are of steel and bronze construction, running in a bath of oil.



Spiral bevel gears in both the Fleetmaster and Fleetbuilder transmissions are oversized and placed at the input end of the transmission for most efficient operation at normal engine speed. All other gears are spur-toothed, heat treated forgings. A centering device is built into all transmissions so that the neutral position between forward and reverse is automatically located.

The Fleetbuilder and Fleetmaster lines are each available in eight sizes ranging in capacities from 4 to 9 cubic yards.

Torque Converter Loader

Manufacturer: J. I. Case Co., Department EE, Racine, Wis.

Claims: A new low-priced case wheel-type loader features power boosting torque converter drive. Standard equipment also includes self-leveling bucket, shuttle transmission, and full-time power steering.

Designated the Case "420," the wheel loader is designed with sufficient power and stamina to be used for actual production digging assignments.

Behind the new tractor's power is torque converter drive which actually doubles push-power at the all-important low working speeds. Formerly available only on larger, more expensive wheel loaders and crawler tractors, the torque converter increases the 420's traction because the operator can nudge the bucket into the ground or stockpile smoothly and apply extra power steadily, without spinning wheels or stalling the engine.

Case points out that the torque converter also cushions shock loads and prevents damage to engine or power train; automatically adjusts travel speeds to varying loads; and completely eliminates clutching and engine stalling. A simple lock-out lever on the dash permits operators to switch the unit from torque converter to direct drive while on-the-go for faster cross-country or highway travel between assignments, for safer downhill operation, and for using the backhoe.

The unit develops 4,600 pounds breakout force. The bucket is 63¾ inches wide with 25° rollback and full 90° forward roll at ground level. The exclusive self-leveling device eliminates spillage as it prevents the bucket from tipping backward when raised.

"Just as soon as I turn my back!"

Grid Compacter

Manufacturer: Hyster Co., Department EE, 2902 N.E. Clackamas St., Portland 8, Ore.

Claims: A new Hyster self-propelled, high-speed compaction machine matches compaction yardage with the high spreading capacity of earthmoving machines.

The DW20A grid compacter consists of a Cat DW20 tractor prime mover (Series C, D, E or F) with two grid wheels mounted on driving axles, and a two-wheel grid towed unit. Grid wheels are cast alloy steel heat-treated to 300 plus Brinell.

Steel slab ballast for the prime mover and towed unit plus sand in the wheel

cones give wheel reactions of 30,800 pounds for the prime mover rear wheels and 32,300 pounds for the towed unit wheels.

The compacter combines high operating speeds—from 5.5 to 15.3 mph—with deep penetration, impact and

Continued on page 64

Combining boom telescope with three digging motions, this H-3 Hydrohoe cuts through brick-hard adobe to dig a water line trench at Montebello, California.

To give you a money-makin' edge . . .

Hydrohoe-Hydroshovel . . . Jack of All Digging —Master at Shaving Costs

Bucyrus-Erie Hydrohoes and Hydroshovels combine digging motions to do all kinds of excavating and cleanout work — dig manholes, valve and transformer pits, sewer and gas line trenches, to name a few. By combining motions, you spot the dipper at the best bite angle, get bigger loads faster, then move the dipper mouth way up to reduce spillage. You work fast and easy — and accurately. You save time, shave digging costs to the bare minimum. Combining boom telescope for positioning and dipper wrist action makes it easy to dig around rocks, pipe and conduit — a money-making edge for tricky jobs.

For high-speed and big-production digging, selector valve lets you concentrate *speed* where you want it when you want it — another profit-building edge for you.

Your Bucyrus-Erie distributor wants to show you *all* the money-making edges of the H-5 . . . and H-3 Hydrohoes on your digging jobs.

241H58C

Other Hydrohoe money-makin' edges

- reverse the dipper and you have a high production swing loader
- choice of standard, wide, narrow or special utilities dippers
- extra attachments carried on the Hydrohoe
- precise, smooth hydraulic control and power
- short tail swing lets traffic move while hoe works
- low-cost new or used suitable commercial truck mounting

BUCYRUS ERIE HYDROCRANE

Over 50% of Hydrocranes Sold Last Year Were Repeat Sales

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

FOR 50 YEARS...
Finest in the Field!
Rely on the bucket contractors rely on. The Omaha Dragline Bucket gives full load with every cast. Perfect balance makes it easy to spot dump. Alloy steel cutting teeth stay sharp, tough and ready. Strike pay dirt now! Complete information and specifications await your letter.
DRAKE-WILLIAMS MOUNT
• OMAHA, NEBR.
OMAHA
DRAGLINE BUCKETS

New Equipment . . .

Continued from page 62

kneading compaction. Width covered per pass is 10 feet 2 inches; turning radius is 17 feet. The DW20 tractor provides ample power and traction for maneuverability on grades and on difficult surface conditions.

Hyster manufactures over 30 tractor attachments for Caterpillar-built tractors.

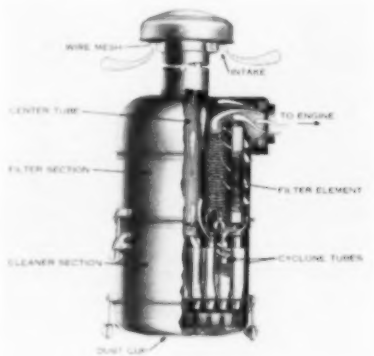
Dry Type Air Cleaner

Manufacturer: Caterpillar Tractor Co.; Department EE, Peoria, Ill.

Claims: A new dry type air cleaner for use on Cat DW20 and DW21 tractors gives new efficiency.

Proved through extensive testing for many thousands of hours on such applications as land clearing, construction and logging, the cleaner removes 99.8% of all dirt from the diesel's intake air. It is fully effective at any engine speed and is designed to speed servicing and reduce maintenance.

A disposable resin impregnated cellulose filter, multi-cyclone precleaner, aluminum center tube, housing and collecting tray make up the cleaner unit. During operation, air is drawn through the stack cap, passes downward through the aluminum center tube and enters the multi-cyclone precleaner. The precleaner is made up of two aluminum spirals (similar to a spiral staircase) and a group of vertical, funnel shaped nylon tubes.



As the air enters the spirals it begins to swirl, setting up a centrifugal action. The dirt particles, being heavier than air, are forced to drop out of the nylon tubes into the collecting tray. About 95% of the dirt particles are removed at this point. Air then travels upward through small aluminum tubes set inside the nylon funnel sections to the resin impregnated cellulose filter element. The element removes the remainder of the dirt and the clean air is directed into the intake manifold of the diesel engine.

The dry type air cleaner is designed to greatly reduce maintenance costs. Since the time needed to service the unit is reduced, machine availability is increased. Moreover, the cost of replacement elements is considerably less than the cumulative cost of oil and man hours necessary for servicing oil bath types.

Under most conditions the collection cup requires servicing once each day. This simply consists of removing the cup and emptying out the accumulated dirt. The dry type element is usually removed and cleaned at engine oil change periods. The element may be cleaned up to six times before it must be discarded. Cleaning is accomplished by using either a reverse flow of water or compressed air. The element can be checked for effectiveness by holding a lighted bulb in the center hole. If light shows through, the element is defective and should be replaced.

The new units also eliminate the danger of engine damage resulting from infrequent servicing. When the paper element becomes plugged, the engine will lose power and begin to smoke. This visual warning acts as an automatic reminder that the cleaner must be serviced, and offers positive protection against carryover of dirt into the engine. As a safety feature, the multicyclone precleaner causes moisture or sparks to be directed to the dust collection cup.

Grapples, Grabs

Manufacturer: Erie Strayer Co., Department EE, Rudolph Ave., Erie, Pa.

Claims: Erie Strayer has added grabs, grapples and orange peel buckets to its bucket line. The new series is designed for handling pulpwood, logs, stumps, rock, riprap, boulders, scrap metal and other hard-to-handle materials.

Some of the grapple features are heavy welded construction; oversized pins and bushings; recessed Alemite grease fittings; up to four parts of line reeving; large cast steel sheaves; and positive socket and wedge cable attachment.

Erie Strayer has been making clamshell buckets for 45 years. The line includes two-line clams for construction industry, hook-ons and electric models. With the addition of the new models, the line is expanded to include over 350 different models and sizes of buckets.

TONS FOR PENNIES

Four-yard bites, fast cycle time made faster by electric swing and the power and strength for the toughest digging enable the Marion 111-M to move tons for pennies. Now bigger, stronger and better than ever, the 111-M is proving this on hundreds of jobs all over the world, including this New England toll road project. Look for the 111-M in mines, quarries and heavy construction everywhere. Ask your Marion Distributor for complete information.

You get **MORE** *with* **MARION**

TODAY'S MARIONS GIVE YOU MORE IN SUSTAINED, LOW-COST PERFORMANCE

MACHINE	Shovel Capacity	AVAILABLE AS . .			
		Hoe	Crawler Crane	Truck Crane	Special Crane
35-M	¾	Yes	Yes	Yes	—
43-M	1	Yes	Yes	Yes	—
362	1½	Yes	Yes	—	Yes
93-M	2½	Yes	Yes	—	Yes
101-M	3	—	Yes	—	—
111-M	4	—	Yes	—	—

MARION POWER SHOVEL CO. • MARION, OHIO
A Division of Universal Marion Corporation

Send me information about MARION ..... yard shovels, ... yard hoes and ..... ton cranes (☐ crawler mounted ☐ truck mounted).
☐ Have a salesman call.

Name ..... Title .....

Company .....

Street .....

City ..... Zone ..... State .....

CATERPILLAR'S PROJECT

PROJECT PAYDIRT pays off for you...

NOT in the Contract

Taxi driver, proudly: "And this is our largest skyscraper."

Old lady, excitedly: "A skyscraper! When can I see it working?"

Mrs. Uppercrust was showing the new maid around the house. As they came to the dining room, she said, "This dining set goes back to Louis the Fourteenth."

"That's nothing," said the maid. "My whole living room set goes back to Sears the fifteenth."

Customer: "I want to see a pair of stockings for my wife."

Clerk: "Sheer?"

Customer: "No. She's at home."

When Mahoney saw Mrs. Butterbaugh, the neighborhood gossip, coming up the walk he took off for the basement. After an hour he called up to his wife, "Has that old windbag left yet?"

Equal to the occasion his wife answered, "Yes, dear, she left an hour ago. Mrs. Butterbaugh is here now."

Officer: "Hey, lady, you can't park by the hydrant."

Lady: "Why not? The sign says 'Fine for Parking.'"

The young girl was worried as to how her husband would act on their first honeymoon night. Her mother reassured her that all would be fine and gave her instructions: "You arrive in the hotel bedroom, he'll say he's out of cigarettes and disappear. Then you undress and hop into bed."

It happened just that way. They arrived at their room, the husband duly patted his pockets and announced, "I'm going to get some cigarettes." When he returned there was his wife tucked up snugly in bed.

"What in the heck are you doing there?" he demanded. "We haven't been down to dinner yet!"

"Well, well! I see your company wants this job pretty badly."

"Now that will be a premium of $16.37 per month on a straight life," said the insurance salesman. "That's what you want, isn't it?"

"Well," the customer replied, "I would like to play around a little on Saturday nights."

A man sat down in a restaurant, unwrapped a package of sandwiches and poured a glass of water from the carafe.

The manager was about to remonstrate with him.

"Who are you?" asked the man.

"I am the manager," came the reply.

"Just the man I want to see. Why isn't the orchestra playing?"

News item in an Iowa paper: "Local police are puzzled over the finding of a car parked in a lonely neighborhood containing a full case of Scotch whiskey. So far they have found no trace of the owner, but Captain Grady is working hard on the case."

A contractor, while enjoying a convention in a large city, attended a girly show with some of the boys and the next day was obliged to go to an oculist for treatment.

"When I left the show last night," he told the oculist, "my eyes were red and swollen."

"After this," advised the oculist, "try blinking once or twice during the show. You won't miss much."

Demure young thing: "Oh, what kind of an officer are you?"

Officer: "I'm a naval surgeon."

Demure young thing: "Dear, dear . . . how you doctors do specialize."

The Scottish farmer had fallen into the well. Treading water vigorously, he shouted for his wife. "Hold on!" she cried. "I'll call the men from the field."

"Wait a minute," he called. "What's the time?"

"Eleven-thirty."

"Then bide a wee. I'll swim roon' till their dinnertime."

Cannibal chief to son: "How often have I told you not to talk with someone in your mouth?"

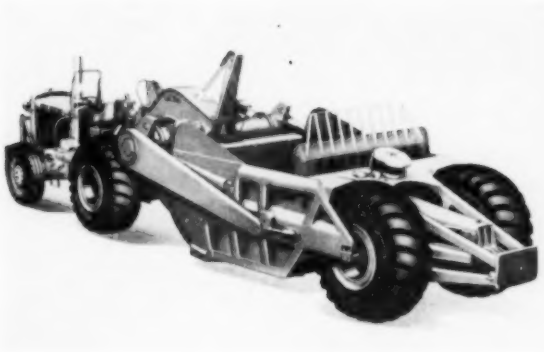
A clerk was handed a pay envelope which, by error, contained a blank check.

The astonished clerk looked at it and moaned: "Just what I thought would happen. My deductions have at last caught up with my salary."

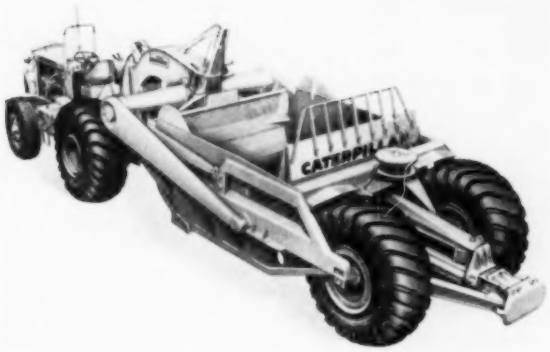
CATERPILLAR'S PROJECT PAYDIRT

PROJECT PAYDIRT pays off for you...

NOW 2 SCRAPERS FOR THE DW20!



The new LOWBOWL
NO. 482
24 cu. yd. struck
34 cu. yd. heaped



The popular LOWBOWL
NO. 456
18 cu. yd. struck
25 cu. yd. heaped

To broaden the profitable uses of the high-speed DW20 four-wheel Tractor, Caterpillar now offers a big new LOWBOWL Scraper—the No. 482, rated at 24 cu. yd. struck, 34 cu. yd. heaped.

The popular No. 456, rated at 18 cu. yd. struck and 25 cu. yd. heaped, remains in the line. As a result, this provides you with a choice of two sizes of rugged, heavy-duty scrapers to better match the DW20 to the material and haul conditions on your job.

In short, here's where each scraper will fit best for maximum production at lowest cost per yard: The No. 482—in good loading conditions and haul roads of minimum grades and low rolling resistance. The No. 456—on adverse grades and average-to-high resistance haul road conditions.

In addition to the Cat No. 482 and No. 456 Scrapers, a complete Athey wagon line is available for use with the DW20. Whatever the job, you'll find the right earthmovers for it at your Caterpillar Dealer. See him today for complete facts about the big new No. 482.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

PROJECT PAYDIRT:
Caterpillar's multi-million-dollar research and development program—to meet the continuing challenge of the greatest construction era in history with the highest production earthmoving machines in the field.

Additional facts about the No. 482

Like all developments of Caterpillar's PROJECT PAYDIRT, the No. 482 has been thoroughly tested in the field. Its high capacity offers the increased production essential to profitable performance on today's big jobs. It uses 33.5 x 33 (26-PR) tires. It is cable operated for fast, accurate control. Its three-piece "Spacesaver" draft frame can be disassembled to provide a shipping width of only 11' 6"—three inches narrower than the No. 456. Its new bowl lift design and new push block arrangement increase loading and dumping efficiency. And its sturdy, simplified construction delivers many hours of trouble-free operation with minimum maintenance.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

BORN OF RESEARCH
PROVED IN THE FIELD

New Trade Literature

Subject: **Torque Fluid**

Content: An illustrated folder describes the use of D-A torque fluid in heavy-duty automatic transmissions, torque converters, rotary air compressors and hydraulic systems. The main advantages listed are superior oxidation stability; prevention of varnish or sludge formation; increased efficiency due to carefully controlled viscosities; prevention of seal shrinkage or cracking; controlled swelling of seals to an ideal maximum of 0.2%; and retention of proper fluidity in extremely cold weather because of the fluid's pour point of minus 35 F. The torque fluid is recommended for automatic transmissions and torque converters manufactured by General Motors' Allison Div., Clark, National Supply, Twin Disc and others. For rotary compressors, the fluid's high temperature oxidation inhibitors prevent varnish and sludge—the most common cause of maintenance and repair in this type application. When used in hydraulic systems, the torque fluid provides maximum protection against deterioration of seals and rubber hose because of a seal preservative.

Where to get: D-A Lubricant Co., Inc., Department EE, Indianapolis 23, Ind.

Subject: **AGC Safety Manual**

Content: The fifth revised edition of the *Manual of Accident Prevention in Construction*, official safety manual of the Associated General Contractors of America, has been released. This edition, considerably expanded from the fourth edition issued in 1952, includes many substantial revisions and additions necessary because of developments in the past six years which have had a major effect on construction technology. For the first time, the new revised edition has been printed in loose-leaf form to permit frequent additions and changes in the future. The same sequence of sections was followed in the new manual as that utilized in previous editions. Some sections with closely related subject matter were combined. The entire manual was reviewed by experts. The sections on explosives, concrete construction, scaffolding, power tools and marine equipment were enlarged and brought up-to-date. The section dealing with highway construction was greatly enlarged in scope, due to increased emphasis on this field of construction, with resultant large numbers of new contractors doing this type of work and increased public exposure to construction operations. Numerous illustrations, tables and charts were added, including many detail sheets, furnished by the National Safety Council, which supply practical designs for job safety measures and devices. Manuals cost $3.25 each, plus postage.

Where to get: Associated General Contractors of America, Department EE, 20th & E Sts., Washington 6, D. C.

Subject: **Earthmoving Line**

Content: A new Euclid folder describes the entire line of earthmoving equipment. Twenty-four different models are pictured and described. Included are condensed specifications on nine rear-dumps, three bottom-dumps, three haulers, six scrapers, one crawler tractor and two log haulers. Also included are illustrations and brief descriptions of the more important features to be found in each type of equipment. Ask for form 326R.

Where to get: Euclid Div., General Motors Corp., Department EE, Cleveland 17, Ohio.

Subject: **Electric Generators**

Content: A revised blue book of general information concerning the selection of engine-driven electric generating plants is available from Onan. The pocket-sized booklet traces the history of electric plant development from early stages where storage batteries were necessary to today's modern single-unit, engine-generator power plants. Three general groups of electric plants are described—alternating current, direct current and battery charging. The booklet also reviews the three types of prime movers which furnish the mechanical power for driving the generator: gasoline engine, diesel engine and gas engine. Cost of operation and installation of each type are discussed. Differences of engine cooling are compared, starting methods are described and a concise summary of important points to remember in selection of an electric generating plant is included.

Where to get: D. W. Onan & Sons, Inc., Department EE, Minneapolis 14, Minn.

Subject: **Drilling Tools**

Content: A revised 24-page catalog contains illustrations and complete specifications of Brunner & Lay carbide drill bits, drill rods, as well as air tool accessories—moil points, clay spades and asphalt cutters. It includes suggestions how to make carbide drill bits do more work and last longer, plus instructions for sharpening and hardening moil points and digging chisels. Ask for catalog #358.

Where to get: Brunner & Lay, Inc., Department EE, 9300 King St., Franklin Park, Ill.

New Movies . . .

Subject: **Pulp Logging**

Content: The tremendous growth of the pulpwood industry is pointed up in a new motion picture, entitled *Pulpwood Logging*, produced by Caterpillar. The 23½-minute sound-color film covers comprehensively the details of forest site preparation, cutting, hauling and loading logs for mill delivery. Because the film tells a complete pulpwood logging story, it will be of interest to a wide audience. It features the importance of mechanization and places emphasis on the many jobs that are profitably handled in this manner. How the good logger chooses equipment that will stand up economically under difficult logging conditions, which attachments he selects to do the required job most effectively, what teamwork between men and machines is necessary for a successful operation—these are questions this film answers for the viewer.

Where to get: Caterpillar dealers or Advertising Div., Department EE, Caterpillar Tractor Co., Peoria, Ill.

This 110-B shovel digs and loads out 4,500 yards of copper ore and overburden every 8-hour shift in a western copper mining operation.

Get INSTANT EXTRA TORQUE to meet every load

Pace-setting Bucyrus-Erie mining shovels give you an electrical control system that speeds acceleration and deceleration on every move, gives instant, extra torque to meet the load, speeds every work cycle.

It's the Bucyrus-Erie improved Ward Leonard variable-voltage control system — job-proved and famous for outstanding results in major open pit mines all over the world.

Your operator commands every operation with well-grouped, simple controls for exceptionally smooth digging, swinging, hoisting, and propelling action. When you want speed . . . or torque . . . you GET it!

The result is more pit output at lower cost. Less mechanical and electrical maintenance, too. Write today for the complete story of these big Bucyrus-Erie electric mining shovels —4½-yd. 110-B, 6-yd. 150-B, 8-yd. 190-B. Bucyrus-Erie Company, South Milwaukee, Wisconsin.

192L58C

BUCYRUS ERIE

MODERNIZE to economize!

TO ADVERTISE: All advertising in this section is payable in advance. Rate: $1.00 per line, or $12.00 per inch of 12 lines. Minimum charge $4.00. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number. If blind advertisement is desired. Be sure to enclose the correct amount of money with your order. Closing date—10th of preceding month. Example: January closes December 10th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

Bucyrus-Erie 750-B shovel, serial No. 9725. Shipped from factory in 1928. Has 95-ft. boom, 6¾-ft. handle and 20-cu. yd. dipper. Location Ohio. Price: $150,000, as is, where is. Box 3737.

630-B Bucyrus Erie Elec. Drag, 195', 10-yd.
15-W Bucyrus Erie Elec. Drag, 215', 13-yd.
9-W Bucyrus Erie Diesel Drag, 175', 13-yd.
7400 Marion Elec. Drag, 160', 13-yd.
625 Page Diesel Drag, 150', 10-yd.
723 Page Diesel Drag, 130', 10-yd.
621-S Page Diesel Drag, 125', 7-yd.
200-W Bucyrus Erie Diesel Drag, 125', 6-yd.
7-W Bucyrus Erie Diesel Drag, 180', 5-yd.
5-W Bucyrus Erie Diesel Drag, 100', 6-yd.
2400 Lima Dragline, 130', 5-yd.
4500 Manitowoc Drag, 120', 5-yd.
88-B Bucyrus Erie Drag, 90', 4½-yd.
111-M Marion Drag, 80', 4-yd.
1055 P&H Dragline, 80', 3½-yd.
3900 Manitowoc Speederane, 100' boom.
3500 & 3000 Manitowoc Crawler Cranes.
3560 Marion 26-yd. Elec. Shovel.
750-B Bucyrus Erie 20-yd. Elec. Shovel.
5480 Marion 18-yd. Elec. H.L. Shovel.
170-B Bucyrus Erie 6½-yd. Elec. Shovel.
120-B Bucyrus Erie 4-yd. Elec. Shovel.
111-M Marion 4-yd. Standard Shovel.
Large selection of smaller Shovels and Draglines available.
Model T-250 Reich Truck Mounted Rotary and Down-the-Hole Drill.
Lima Model "C" Roadpacker.
Euclid Trucks, Truck Cranes, Dozers, Scrapers, Front End Loaders, Drills, Buckets, Attachments and other misc. equipment available.

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

For Sale—Used Bucyrus-Erie 37-B shovel-dragline combination. Serial No. 12225 with light plant, Caterpillar engine. Includes shovel front end with 1½-cu. yd. dipper. Includes extra Cat D13000 engine with clutch and pulley, which is in good condition. Can be used as spare for 37-B. Price $6,500. F.O.B. Ironton, Minn.

Contact N. E. Hill
Pittsburgh Pacific Co. Ironton, Minn.

Lima Model 1201 shovel, serial #3339-10, with 32-ft. 6-in. boom, 22-ft. dipper handle, 3½-cu. yd. Amsco dipper, Cummins diesel, 2-KW Kohler light plant. Available about Jan. 1, 1959. Price F.O.B. cars Ely, Nev. Price: $80,000. For additional information please contact:

LANG CONSTRUCTION EQUIPMENT CO.
P. O. Box 1646 Salt Lake City, Utah
Phone: DAvis 2-1241

SMALL SHOVELS, CRANES, DRAGLINES—UP TO 2½ YDS.

Northwest Mdl. 25, ¾-yd. backhoe, Serial #16077, Murphy diesel engine, extended crawlers, 28-in. treads.
Excellent condition $15,000
Michigan Mdl. C-24, ¾-yd. backhoe, 45-ft. crane boom, fairleads, Serial #4005, Hercules gas engine, extended crawlers.
Very good condition $10,500
Lorain Mdl. TL25, Serial #19697, ¾-yd. comb. Backhoe and shovel, Waukesha gas engine, standard crawlers, 22-in. treads. Reconditioned.
Bucyrus-Erie Mdl. 10-3 Hydrocrane, Serial #110285, mounted on R162 International truck chassis, 18-26 ft. telescopic crane boom, ¾-yd. backhoe available.
Very good condition $6,000

CHAPMAN BINDER MACHINERY CO.
Brighton St., Union, N. J.
MUrdock 8-0060

For Sale: Dixie backhoe with shovel front, mounted on GMC, Serial #33647. New '55, excellent condition. Located eastern N. Y. Price $6,000. Box No. 3739.

1—51-B Bucyrus-Erie heavy-duty dragline 80-ft. boom, Cat diesel D337F with torque converter, long and wide tracks and maximum counterweight, Serial No. 117039. First put to work 1957. Has worked a total of nine months. Like new. Located central Mo.
1—Northwest Model 25 crane with 45-ft. boom.
1—Model H Scoopmobile, hydraulic loader, ¾-yd. 1955 model, excellent condition.
1—12 ton single axle trailer (7:50 x 20 tires new) air brakes new.
1—Model C Scoopmobile 22-ft. tower, pallet fork or bucket, excellent condition.
1—Model BB120 Wooldridge scraper, 14 to 18 yd., good.
1—Model 41 Lorain ¾-yd. shovel with Cat D4600 engine, 1945 model. Needs some repair.
8—105-cu. ft. air compressors, Jaeger, Ingersoll-Rand, Davey, Worthington, Sullivan, Chicago-Pneumatic.
2—365 Gardner-Denver compressors, good.
1—Model 10-20 Unit backhoe mounted on Dart truck, excellent.
1—1½-yd. Kiesler clamshell-rehandling.
1—¾-yd. Esco Orange Peel bucket.
1—HH-20 Allis-Chalmers with "Cat" 25 DDPCU.
1—Model 300 International Utility Tractor with Wain-Roy backhoe, 1956 models, excellent.

CONTRACTORS SUPPLY
620 East 18th St. Kansas City, Mo.

Bucyrus-Erie Model 22-B, Cat. diesel, shovel front or Hoe, good condition.
Bucyrus-Erie 22-B G.M. diesel, shovel front or hoe, 20-in. treads. Has had minimum service, excellent condition.
Bucyrus-Erie Model 22-B gasoline engine, D.C. or C.S., 45-ft. boom, fairleads, rudomatic. Good operating condition.
2—Bucyrus-Erie 22-B Excavators with Chrysler 8-cylinder gasoline engines. Old Serial numbers but 90% new.
1—50-B Bucyrus-Erie dragline, G.M. diesel 40-ft. boom. Excellent buy.
1—Lima Model 34 excavator, 35-ft. boom and backhoe. Buda diesel, good operating condition.

Subject to inspection and prior sale.

R. S. ARMSTRONG & BRO. CO.
P. O. Box 2363 Atlanta 18, Ga.

Marion, model 362, with 2-yd. shovel front, 671 GM with Allison torque converter, 22-ft. boom, 18-ft. stick, 14-ft. 8-in. crawler, 33-in. shoes. Contact: Wolverine Tractor & Equipment Co., 25900 W. 8 Mile Road, Detroit 19, Mich. Phone: KEnwood 4-8400.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

BUCYRUS-ERIE Model 22-B, shovel. S/N 45148. International UD-14 diesel engine. Good condition. U-179 .....$14,300.
HANSEN Model 31 shovel, backhoe & dragline. S/N 2120. International UD-6 diesel engine. Price includes all three front ends.
U-32 Only $3,950
KOEHRING Model 304, ¾-yd. shovel, backhoe & dragline. S/N 5647. (GMC 4-71 diesel engine has had only 830 hours use). This unit has been completely overhauled in our shop. Price includes all three front ends. U-178 .....$15,900
LINKBELT SPEEDER Model LS-52, ¾-yd. shovel & dragline. S/N 6GF791. Powered by Cat diesel engine, and has Speed-O-Matic controls. Unit is in good condition. U-276 ..$13,500
NORTHWEST Model 25, ¾-yd. shovel, dragline, & hoe, 40' crane boom & cambered type hoe boom, 30" track shoes. S/N 16806. This late 1955 model machine is in excellent condition and guaranteed. U-130 .....$21,000
NORTHWEST Model 80-D, 2½-yd. shovel & dragline, including 60' boom & bucket. S/N 12504. Murphy diesel engine has been completely rebuilt. Good condition & warranted. U-238 .....$29,500
YALE electric crane, Model K 42-SH-6-7-78U. 6000# capacity, 12' to 18' telescopic revolving boom and hard rubber tires. It has never been used, was Govt. surplus. Unit sells new from factory for approximately $17,900. Our price less batteries & battery charger. U-82 ..$4,750

CALL—WIRE—WRITE—NOW!

LANG CONSTRUCTION EQUIPMENT CO.
P. O. Box 1646 Salt Lake City, Utah
Phone: DAvis 2-1241

Model L Quickway-Machine is equipped as a backhoe, mounted on Federal truck. This machine is fair to good and can be bought accordingly.
Bucyrus-Erie 10-B TC combination dragshovel and dragline, standard ¾-yd. dragbucket, Buda power on excavator, Chrysler power on CCC. This is one of our finest pieces of used equipment.
Standard Batch Type Asphalt Plant, 4 compartment bin, scales, pugmill, bucket elevator, feeder pumps, electric motors. Machine does not have dryer or screens. F.O.B. Denver, Colo. $15,000
Bucyrus-Erie 15-B, equipped with backhoe, dragline and shovel, Chrysler gas engine. Machine is located in Denver and we welcome your inspection.
Used excavator attachments. Bucyrus-Erie 22-B shovel attachment, Lorain L-80-L 1¾-yd. shovel attachment complete. Bucyrus-Erie 30-B shovel attachment like new.

THE COLORADO BUILDERS' SUPPLY CO.
1534 Blake St. Denver 2, Colo.

38-B Bucyrus-Erie 1½-cu. yd. shovel #85914 with Caterpillar diesel engine, 33-in. wide treads. Located in Seattle. Excellent condition.
20-B Bucyrus-Erie shovel with Hercules RXC gas engine. 1940 overhauled. Serial #16822.
54-B Bucyrus-Erie 2½-cu. yd. shovel with Cummins diesel engine and torque converter, 36-in. wide treads. Serial #118053. Machine like new.
Model 25 Northwest diesel shovel, long tracks, Murphy engine, 2-speed travel; located near Seattle.
Model 25 Northwest diesel shovel and pull shovel, GMC diesel engine. Serial #7723. Located in Seattle.
Model 25 Northwest dragshovel with Caterpillar D318 diesel engine. New tracks. In excellent condition. Serial #11986. Located in Seattle.
Model L-41 Lorain hoe with Waukesha gas engine. Serial #17832.

CLYDE EQUIPMENT CO.
3410 First Ave., So. Seattle 4, Wash.

SMALL SHOVELS, CRANES, DRAGLINES — UP to 2½ YDS.

Lorain Model L50, 1-cu. yd. capacity, 70-ft. boom, pendant suspension, fairleads, tagline, long and wide tracks. $14,000
Schield Bantam Model M49 backhoe and crane with 35-ft. boom, mounted on White half-track. $5,500
Link-Belt Model LS50, ½-yd. capacity, shovel and backhoe crawler mounted, Buda gasoline engine. $6,000
"Quick-Way" Model L, ½-yd. capacity, 40-ft. boom, mounted on White halftrack. ...$5,500
Unit ½-yd., shovel, crawler mounted. Powered by Chrysler gasoline engine. $3,500
Koehring model 304, ½-yd., backhoe, crawler mounted, with IHC Model UD14 diesel engine. $10,500
"Quick-Way" Model S, ¼-cu. yd. backhoe, mounted on White halftrack. $3,000
The above priced F.O.B. Elizabethtown, Ky.
Lorain Model 41, ¾-yd. crane, dragline, clamshell, Cat. D318 engine. Price $8,900. F.O.B. Elizabethtown, Ky.
2—Used rear dump Euclids—15 ton trucks. Lot Price $15,000. Elizabethtown, Ky., Jim Waddell.

BRANDEIS MACHINERY & SUPPLY CO.
P. O. Box 1705 MElrose 7-4741
Louisville, Ky.

1—Browning Model TC-15, 17½-ton truck crane mounted on 6 x 4 Hendrickson carrier, complete with remote control from crane operator's position, 95-ft. boom, 15-ft. jib; condition good. F.O.B. Cleveland, Ohio $11,000
1—Schield Bantam Model CR-35 wagon crane with 40-ft. boom, 8-ft. jib, outriggers, independent boom hoist, swing, gasoline power—excellent condition.
F.O.B. Cleveland, Ohio $10,500

W. T. WALSH EQUIPMENT CO.
12750 Berea Road Phone: Clearwater 2-4660
Cleveland 11, Ohio

Bucyrus-Erie 15-B combination dragline-dragshovel, Cat D315 power unit.
Bucyrus-Erie 22-B dragline, Cat D318 power unit.
Bucyrus-Erie 19-B dragline, Chrysler 8 engine.
Bucyrus-Erie H-3 Hydrocrane, mounted on F600 Ford truck, complete crane and hoe equipment.
Link-Belt LS75 dragline, Cat D4600 engine.
Insley ¼-yd. K12, combination dragline-dragshovel, Buda 326 engine.
Quickway ⅜-yd. combination dragline-dragshovel, International U-164, mounted on White halftrack.
Michigan T6K truck crane, combination dragline-dragshovel, Hercules engine.

Write or Call

WM. H. ZIEGLER CO., INC.
2929 University Ave., S. E.
Minneapolis 14, Minn.
Phone: FRanklin 1-7971

⅜-yd. Model 10-B Bucyrus-Erie shovel (1949) good working condition. Available immediately.
⅜-yd. Model H-3 Bucyrus-Erie Hydrocrane (1951) mounted on I.H.C. truck chassis, equipped with operator's cab, tagline reel, clamshell bucket. Very good condition.
¾-yd. Model 375 American crawler shovel with Waukesha gas power (new 1949). Can go right to work. $3,500
¾-yd. Model 255A P&H crawler dragline, equipped with fairlead, 35-ft. boom, Cummins diesel engine. Priced to sell.
1-yd. Model LS-90 Link-Belt shovel (new 1953), Waukesha gas power. Excellent condition. For sale or for rent.
1-yd. Model 455 P&H crawler crane-clam-dragline with 75-ft. boom, 15-ft. jib, Chrysler 8-cyl. gas engine. Entire machine in excellent condition. F.O.B. Milwaukee, Wis.
1¼-yd. Model 33-B Bucyrus-Erie crane-clam-dragline machine, 70-ft. boom, independent boom hoist, gas power, in very good condition. A lot of machinery for $16,500.
1½-yd. Model 604 Lima crane-dragline machine (1951) with Cummins diesel engine, 80-ft. boom and fairlead. Was overhauled last winter, very good condition. Price $27,500
2-yd. Model 820 Lorain crane-clam-dragline combination with Cat D13000 diesel engine, swamp cats, 110-ft. flange type boom, fairlead, pressure lubrication system; in excellent condition.
3-yd. Model 1201 Lima crane-dragline machine (1950) with Buda diesel engine, long wide crawlers, 110-ft. boom. In good condition. Priced to sell under $38,000.

CRANES FOR RENT

3-yd. Model 71-B Bucyrus-Erie dragline.
2-yd. Model 820 Lorain crane-clam-dragline.
1½-yd. Model 604 Lima crane-clam-dragline.

J. P. WAITE, INC.
3304 W. Pierce St. P. O. Box 313
Milwaukee 1, Wis. EVergreen 4-1900

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

1—Osgood ½-yd. backhoe, long wide cats, gas engine, 5 years old. Good buy.
1—Michigan ½-yd. backhoe with cambered boom, gas engine, 4 years old. Excellent buy.
1—Koehring 303—¾-yd. dragshovel, standard crawlers Waukesha gas engine.
1—Worthington 16-S two bag concrete mixer on 4 pneumatic tires with 4 cylinder Wis. gas engine. Excellent buy.
1—Wiley PM-215 Patchmobile portable asphalt patching unit on two pneumatic tires, complete with rotary dryer.
1—Ruhr M-1½-yd. heavy duty grapple. New—excellent buy.
1—Wayne 36-in. rider industrial vacuum pick-up Power sweeper.
1—LeRoi 315 air compressor on four pneumatic tires.
1—H-3 Bucyrus-Erie Hydrocrane on Ford F-6 truck complete with jib and hydraulic bucket. Good condition.
2—GMC Jetcretes with all accessories. Excellent condition.

S. M. CHRISTHILF & SON, INC.
Timonium Road & Harrisburg Expressway
Valley 5-5100 Timonium, Md.

SHOVELS

LIMA Mod. 34 Paymaster, ¾-yd. Crane, 35' boom, G.M. Diesel engine.
As inspected $8,500
BUCYRUS-ERIE 38B Shovel, 20' 5" dipper stick, 1¾-cu. yd. dipper, powered by International Diesel engine. Rebuilt $38,500

SHOVEL ATTACHMENT

BUCYRUS-ERIE Tunnel Shovel attachment for 22B consisting of 14' boom, 12' 10" stick, 1-cu. yd. rock dipper, crowd drum, sprocket and crowd chain. Excellent condition $2,200

TRUCK CRANE

LIMA 44T Truck Crane, 25-ton combination clamshell and lifting Crane, 80' boom, 30' jib, Rudomatic tagline, Dart carrier, 9' wide, Waukesha engines. Very good condition. 30 day guarantee $30,000

SCRAPERS

CATERPILLAR Mod. DW21 Tractor with Cat No. 21 Scraper. Certified Buy.
2 units each $23,500
(6) LETOURNEAU Mod. LS, 4-wheel Scrapers. (11-yd. cap.). Excellent condition.
Each $3,250
(3) LETOURNEAU Mod. LP, 4-wheel Scrapers. (15-yd. cap.). Excellent condition.
Each $4,500

TRACTORS

INTERNATIONAL TD-24 Diesel Tractor with crankcase guard, 24" tracks, pull hook, elec. starter, canopy top, Bulldozer blade and D.D. P.C.U. Good operating condition $9,500
ALLIS-CHALMERS HD-20H Diesel Tractor w/Garwood Bulldozer and D.D. P.C.U.
Operating condition $10,500
CATERPILLAR D8 Diesel Tractor with oil clutch, 24" tracks, pull hook, canopy top and Cat 8S cable blade with Cat No. 25 D.D. P.C.U. Bonded Buy $19,500

TRENCHER

CLEVELAND No. 95 Trencher, option 5, 16" buckets, 21½" cut, powered by Continental gasoline engine. Rebuilt.
Good value $6,600

Subject to inspection & prior sale.

H. O. PENN MACHINERY CO., INC.
140th St. & East River CYpress 2-4800
New York 54, N. Y.

MISCELLANEOUS EQUIPMENT

124 ⅜-cu. yd. type AX medium duty dragline buckets complete with all fittings. Weight 950 lbs. Price $710 each. f.o.b. Evansville, Ind.

BUCYRUS-ERIE CO.
South Milwaukee, Wisconsin

1—New 4-cu. yd. type AX Bucyrus-Erie, medium duty dragline bucket with all fittings. Weight 9,100 lbs. Special reduced price $3,150, f.o.b. South Milwaukee, Wis.

BUCYRUS-ERIE CO.
South Milwaukee, Wis.

MISCELLANEOUS EQUIPMENT

BARBER-GREENE Model 840 asphalt plant. Includes mixer, hot elevator, dryer, dust collector, tank car heater, feeders, towing trailers, tanks, piping, and 879-A Finisher. Equipment is only 2 years old and in excellent condition. Immediately available at an attractive price.
BARBER-GREENE Model 879-A Finisher. Lays 8' to 12' strip. Powered by Leroi gas engine. Unit is in very good condition. S/N 10-55, U-244 .....$7,500
ADNUN Blacktop Paver, S/N 1462. Good operating condition. U-5 .....Only $2,950
CARCO Model "J" logging winch. Good as new. U-65 .....Only $2,900
CARCO Model G-4 logging winch. Perfect condition. $1,900
CEDARAPIDS crusher, 12 x 16. Has Case gasoline engine and mounted on 2 axle trailer with 4 new tires. Has truck height loading conveyor. Good condition. U-272 .....$5,500
CLEVELAND wheel ditcher, "Baby Digger." Digging depth is 4½-ft. Only $1,950
LETOURNEAU "C" electric Tournapull powered with a GMC 6-71 diesel engine. Has 15-yd. capacity. Tires are like new. Excellent condition and warranted. U-3 .....$18,500.
LETOURNEAU Model C Tourn-a-dozer. A good buy at this price $4,500
ALLEN cab for International TD-14A crawler tractor. $225
CAMPBELL cab for Model HO Hough Payloader $175
CAMPBELL cab for Caterpillar D-4 tractor. $150
BUCYRUS-ERIE cab for International TD-9 tractor. $200

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LANG CONSTRUCTION EQUIPMENT CO.
P. O. Box 1646 Salt Lake City, Utah
Phone: DAvis 2-1241

1—New, unused, 20-cu. yd. type "BM" medium duty bare dragline bucket body with teeth. Weight 22,300 pounds. Special reduced price $11,000 F.O.B. South Milwaukee, Wis. John T. Aspel, Bucyrus-Erie Co., South Milwaukee, Wis.

ATTACHMENTS

54-B dragline boom and fairleads.
22-B fairleads—unused.
22-B backhoe attachment.
22-B shovel attachment & crane boom.
15-B shovel attachment—unused.
Lima 34E shovel attach; chain & rope crowd.
P&H 955 fairleads.
N. W. 6 & L82 fairleads.
655 P&H unused backhoe attachment.
Many others on hand.
Season close out at special prices.

AIR COMPRESSOR RENTAL CO., INC.
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2—3-cu. yd. type "BM" medium duty, thoroughly reconditioned, dragline buckets complete with all fittings. Weight 4,800 pounds each. Special reduced price $2,350 each. F.O.B. Evansville, Ind.

BUCYRUS-ERIE CO.
Evansville, Ind.

ONE—2¼-YD. COAL LOADING DIPPER, NEW FOR 38-B. LOCATED NEAR PITTSBURGH. $2500.
BOX 3720

FOR SALE

1—International truck chassis model KR-11, 149-in. wheel base, Ca. 4-6 tons. Motor RED-450-15662 cab Model HFA-58766 chassis #10334 dual tires used as a sprinkler truck.
1—Dart truck model 120-BHD complete, serial #7923 Eng. #WAKH-51072—sprinkler truck.
2—Bucyrus-Erie 54-B Ward-Leonard electric shovels, serial Nos. 19097 and 19098 with 2½-yd. dippers.
1—Bucyrus-Erie Model 27-T electric blast hole drill. Shop #23446 with 15 hp G.E. motor.

PICKANDS MATHER & CO.
Purchasing Dept. 700 Sellwood Bldg.
Duluth, Minn.

Bargain: 30-ton Browning 8-wheel diesel locomotive crane, good condition. $12,000 f.o.b. Detroit
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MISCELLANEOUS EQUIPMENT

LeTourneau Tournadozer equipped with cab, heater, 6 cylinder General Motors Diesel Engine, with electric starter, LeTourneau Model CBD straight blade bulldozer, lights, air steering, air brakes, 21:00 x 25 tires. This tractor has an excellent appearance, and has had very little use. Tires in good condition $10,000

Caterpillar Model D8 Diesel Tractor, Serial 2U-18684, equipped with Caterpillar Model 8-A Cable controlled Angle Blade Bulldozer, Caterpillar Model 24 Front Mounted cable control, electric starting. This machine is in our service dept. where necessary repairs are being made to put this machine in excellent condition. .....Price on Application

Caterpillar Model D8 Diesel Tractor, Serial 11L-9165-SP, equipped with LeTourneau Model R-8 rear mounted double drum cable control unit, Serial P-20828-R8C, 22" grouser tracks. This machine has quite a few hours left in it, good for use as roller tractor. $3,750

International Model TD-24 Diesel Tractor, Serial TDE-5394, equipped with Bucyrus-Erie Straight Blade Bulldozer, Bucyrus-Erie Model P-29 rear mounted double drum cable control unit, seven roller track frame, 22" grouser tracks. This machine has a good appearance. $9,500

Allis Chalmers Model HD-21A Torque Converter, Diesel Tractor, serial HD21A-8528, equipped with Gar Wood Model 281 rear mounted double drum cable control unit, Gar Wood Straight Blade Bulldozer, roller guards, crankcase guard, lights, 26" grouser tracks. $17,500

Buffalo-Springfield 6 to 8-Ton Tandem Road Roller, Serial 53190, equipped with spray bars, wheel scrapers, and powered by 4 cylinder water cooled gasoline engine. This roller is in fair condition, and a few minor repairs would put it in good operating condition. $1,000

LeTourneau Model "M" Scraper, Serial S-18359R6. This Scraper has 6 to 8 cu. yd. capacity equipped with 10:00 x 20 tires, front & dual rear. Good condition. $2,500

Caterpillar Model D6, 74" Diesel Tractor, Serial 9U-371, equipped with 6-roller non-oscillating track frame, large front idlers, 16" wide grouser tracks, Caterpillar Model 46 Front Mounted Hydraulic Control Unit, Trackson Model AE-6 hydraulic Angling Blade Bulldozer, Trackson Model MD-6 Pipelayer, complete with 14' boom and snatch block. VERY GOOD CONDITION. $12,500

Caterpillar Model 12 Tandem Drive Diesel Motor Grader, Serial 8T-523, equipped with cab, heater, lights, electric starting, power steering, scarifier, 13:00 x 24 front and rear tires. This machine is in very good operating condition. $10,750

LeTourneau Model R-8-C Rear Mounted Double Drum Cable Control Unit, Serial P-18026-R8C, complete with power take off shaft for use with Caterpillar D-8 Tractors. Fair condition. ..$250

Bucyrus-Erie Model 10-B Shovel-Backhoe Combination, Serial 72711, powered by Buda Model 6B-273 gasoline engine, with electric starter, mounted on 14" flat pads, equipped with 13' 0" shovel boom, 11' 0" handle, ¾-cu. yd. dipper bucket, 15-ft. straight boom backhoe attachment, ¾-cu. yd. dragshovel bucket. This machine is in fair operating condition $4,250

Quickway Model "E" Shovel & Backhoe Combination, Serial 5142-648, powered by International Gasoline Engine, Serial UCBM-17892, with electric starting, 4/10-cu. yd. backhoe and shovel front, all mounted on International Model 6 x 6 truck with 8:25 x 20 front tires and dual rear. Fair condition. $4,500

Gardner-Denver Model D-89D Wagon Drill, serial number unknown, equipped with Gardner-Denver Model D-89D Hammer, serial H-736, complete with air hoses, line oiler and mounted on rubber tired trailer. Good condition $1,500

Elgin Model 50 Street Sweeper, Serial 1616, powered by Hercules 6 cylinder water cooled gasoline engine, Electric Starting, lights, mechanical steering, 9:00 x 20 tires. Sweeper will need repairs to be put in good operating condition. $1,500

R. L. HARRISON CO., INC.
P. O. Box 1320 **Phone: 7-8811**
1801 4th St., N. W. **Albuquerque, N. M.**

3 New, unused, 3-cu. yd. type "BU"", Bucyrus-Erie lightweight dragline buckets with all fittings. Weight 5,150 pounds each. Special reduced price $1,935 each. F.O.B. Evansville, Ind.

BUCYRUS-ERIE CO.
South Milwaukee, Wis.

When writing **advertisers** please say you saw it in **Excavating Engineer**

Thank You

Notes from the Manufacturers

Arcair Co., Lancaster, Ohio, has named Seymour Becker field representative in the New England states. A native New Yorker, Becker has long been associated with the welding industry in sales and as a qualified welding instructor.

Atlas Powder Co., Wilmington, Del., has appointed Dale A. MacDonald a sales representative in its San Francisco (Calif.) sales district. MacDonald has been a technical representative in the company's explosive sales department in Wilmington since returning to the company last year from military service. He joined the firm in 1955 after receiving a degree in civil engineering from the Michigan College of Mining and Technology, Houghton, Mich.

Aveling-Barford Ltd., Grantham, England, has opened a new Canadian parts depot on Queen Elizabeth Way, seven miles from Toronto, Ont., and near Malton Airport terminal. Known as Aveling-Barford Canada Ltd., the new depot will improve service and assure a full line of spare parts supplies to the firm's Canadian distributor network. John M. Paterson heads depot activities.

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed Phil Peterson as a district sales representative for Hydrocranes, Hydrohoes and Hydroshovels. His territory will include the states of Pennsylvania, Virginia, West Virginia and Maryland, in addition to lower New Jersey and the District of Columbia. Peterson is stationed in New York City.

Gardner-Denver Co., Quincy, Ill., has opened a new plant in Johannesburg, South Africa, for production of pumps and mining equipment. The plant is the eleventh production facility of the company. Eight plants are in the United States. Others are at Woodstock, Ont., Canada, and Rio de Janeiro, Brazil.

Koehring Co., Milwaukee, Wis., has appointed Machinery Mart, 215 Brookpark Rd., Cleveland 9, Ohio, distributor for its Kwik-Mix and Koehring divisions. The firm will handle the complete lines of products manufactured by both divisions. Included in the Koehring products to be offered are power cranes and excavators; pavers and finishers; the Dumptor, an off-the-road hauling unit; and the Mud-Jack for roadbed stabilization. Kwik-Mix products include numerous sizes of concrete, bituminous and plaster-mortar-terrazzo mixers and the Moto-Bug, a material handling unit interchangeable as a fork lift, platform or hopper carrier. Manager of Machinery Mart, a department of Strong, Carlisle & Hammond, is James Cottrell.

Manitowoc Engineering Corp., Manitowoc, Wis., has appointed Hartford Rental Sales Corp., 599 Franklin Ave., Hartford, Conn., distributor for its full line of cranes, shovels, draglines, mobile cranes and hoes in the state of Connecticut.

EIMCO TRACTOR LOADER . . .

Either Overhead or FEL – Provides the most economical means of digging and loading rock

They are massive, heavy-duty, big bucket crawler loaders with job proven, exclusive features which insure high capacity, low maintenance and dependability.

If you want to keep your capital outlay down or have the edge in competitive bidding, call for an Eimco sales engineer to give you full details.

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B - 352

NEW DESIGNS IN CATERPILLAR EQUIPMENT AND PARTS DEPEND ON CREATIVE USE OF HIGHEST QUALITY STEEL

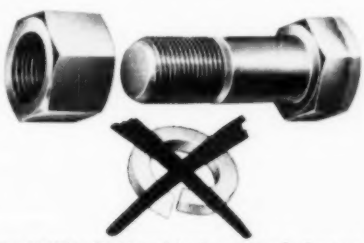
Example: Track hardware, made of stronger pre-tested steel and "Hi-Electro" hardened, stays tight without lock washers, often lasts through two sets of shoes

How much does it cost to pull a tractor off a job to tighten or replace track hardware? It costs plenty, in down time and in service time. That's why Caterpillar's new track hardware is such a good investment.

Caterpillar hardware normally stays tight without the use of lock washers throughout the service life of the first set of track shoes. And, exclusive "Hi-Electro" hardening of dome-shaped bolt heads often permits bolts to be used for a second set of shoes.

Most track hardware looks pretty much alike, but there's a big difference in quality. Steel, for instance. All steel for Caterpillar's new track bolts has a minimum tensile strength of 151,000 pounds per square inch, well above the SAE standard of 120,000-140,000.

The special steel accepted for track hardware is furnace-heated, quenched and tempered to toughen the entire bolt against breaking,



ELIMINATION of lock washer is feature of Caterpillar's new track hardware.

bending and the permanent stretching that leads to loosening of the nut.

Carbon, lost from the surface area in mill rolling and heat treating, is restored by Caterpillar with a carefully controlled, carbon-atmosphere process. Then threads are "rolled" into the bolt, curving the natural flow lines to follow the thread contours, producing threads that are highly resistant to stripping.

The large dome-shaped head receives an exclusive deep and even "Hi-Electro" hardening. This protects the hexagonal corners from mushrooming. Wrenches fit onto Cat bolts after many hundreds of hours of hard use.

This same quality of material, design and manufacture is found in *all* Caterpillar parts. And they're always available at your Caterpillar Dealer. See him today.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

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SERVICE TIP

A torque wrench should always be used to tighten track hardware to factory-recommended torque values. Your Operating and Maintenance Instructions give exact values for each tractor model.

TENSILE STRENGTH of a bolt is tested in Caterpillar Laboratories. Each bolt is capable of supporting the full weight of the tractor for which it is designed.

DON KOPP, Master Mechanic, McCann & Co., Inc., Springfield, Ill.: "We're real boosters of genuine Cat parts, especially track parts. Other brands just don't last as long. When you buy Cat parts you know they are going to fit, last longer and give the best service because they are built to do the job by the people who built the machines."